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A Review on Better Disjoint Mode in Multipath Routing Of E-AOMDV In MANET

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Abstract— A Mobile Ad hoc Network (MANET) is a collection of mobile nodes relying neither on fixed communication infrastructures nor on any base stations to provide connectivity. Each node in the MANET acts both as a host and a router. Designing an efficient and reliable routing protocol for such networks is a challenging issue. For this reason, many routing protocols have been developed, trying to accomplish this task efficiently. Since MANET change their topology frequently, routing in such networks is a challenging task. Multipath routing may improve system performance through load balancing and reduced end-to-end delay . Mobile ad hoc networks, the existing multipath routing protocol AOMDV does not consider the routing metrics such as hop count and energy while selecting the path that leads to inefficient load balancing. . We consider a scheme which could energy conservation, shortest path and load balancing, In this routing scheme, we would consider both the shortest path and the energy conservation in multipath way with proposed energy based multipath routing (E-AOMDV). E-AOMDV selects the number of paths for multipath routing with least hop count and high residual energy while retaining disjoint path selection process of AOMDV. In this review we select the better disjoint mode is contributed by analyzing the performance of E-AOMDV in both node disjoint and link disjoint mode.

Keywords—MANET, E-AOMDV, NODE and LINK disjoint

I. INTRODUCTION

MANET is a self configuring network which is composed of several movable user equipment. These mobile nodes communicate with each other without any infrastructure, furthermore, all of the transmission links are established through wireless medium. According to the communication mode mentioned before. MANET is widely used in military purpose, disaster area, personal area network and so on. MANETs can be operated either in stand-alone fashion or connected to the Internet. Because of features like quick deployment and easy to use, ad hoc networks are useful in wide number of applications like Military operations, emergency rescue operations and wireless sensor network etc.

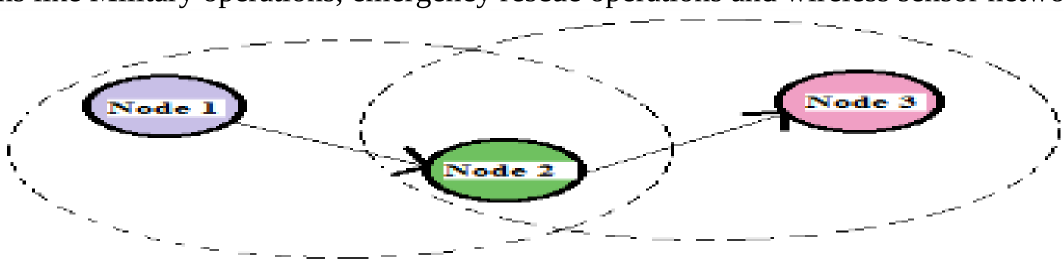

Fig 1: Example of MANE

The routing protocols for a MANET must be adaptive and capable of maintaining routes as the characteristics of the network connectivity change. Designing an efficient and reliable routing protocol for such networks is a challenging issue [1, 2]. For this reason, many routing protocols have been developed, trying to accomplish this task efficiently. Since mobile ad hoc networks change their topology frequently, routing in such networks is a challenging task. Multipath routing may improve system performance through load balancing and reduced end-to-end delay. New route discovery is needed only when all paths fail. This reduces both route discovery latency and routing overheads.

Multiple paths can also be used to balance load by forwarding data packets on multiple paths at the same time, though we will not investigate this aspect in our work [3]. Efficient ad hoc network protocols can support multipath concept with energy constraints to return data effectively without incurring the high operation costs to coordinate and communicate with a large number of small, constrained elements. The original scheme showed an uneven distribution of energy consumption among nodes close to the neighbor and some nodes constantly use more energy than others. Those are nodes that were heavily involved in forwarding packets. If this trend continues, these nodes will die much earlier than the others and will cause the disconnection of the network. Traffic loading balance is another issue which would affect the energy. A routing protocol that does not take into account of traffic load balance will result in usage of paths that are already heavy in traffic load. It will add more burdens on the energy consumption to these paths and indirectly lead to imbalanced energy consumption of the whole network. The nodes in a high traffic load path will 'die' off faster than nodes in paths that have lower traffic load. Thus load awareness routing provides not only a lower end-to-end delay, but also indirectly leads to more efficient energy distribution routing.

II. LITERATURE REVIEW

Routing protocols are required in network for deliver packets from source to destination. The multipath routing providing concept of load balancing but not efficiently distribute the load in network by that the valuable source of communication i.e. energy are affected from it because of packet loss. This paper work is motivated by the idea of taking account of several factors in Mobile Ad hoc Networks (MANET) routing design in a unified way. The rational of our motivation is that most of the multipath routing protocols are designed only based on one criterion, e.g., shortest path considered with balance load or energy conservation. We propose a scheme which could consider energy conservation, shortest path and load balancing, In this routing scheme, we would consider both the shortest path and the energy conservation in multipath way with proposed energy based multipath routing (E-AOMDV). We define an energy factor as that we will use the products of the energy factors of all the nodes along different paths as the selection criteria.[4]

Energy-efficient multicast routing is of primary concern for mobile ad hoc networks (MANET). However, none of existing energy-efficient multi-cast algorithms is applicable to large-scale MANETs, either due to their complexity (which is either NP-hard or polynomial with respect to the network size), or due to the huge overhead caused by frequent exchanges of location information. To solve the scalability and overhead issues, propose the Predictive Energy-efficient Multicast Algorithm (PEMA) which exploits statistical properties of the network, as opposed to relying on route details or network topology.[5]

A Mobile Ad Hoc network (MANET) is a collection of digital data terminals that can communicate with one another without any fixed networking infrastructure. Since the nodes in a MANET are mobile, the routing and power management become critical issues. Wireless communication has the advantage of allowing untethered communication, which implies reliance on portable power sources such as batteries. However, due to the slow advancement in battery technology, battery power continues to be a constrained resource and so power management in wireless networks remains to be an important issue. Though many proactive and reactive routing protocols exist for MANETs the reactive Dynamic Source Routing (DSR) Protocol is considered to be an efficient protocol. But, when the network size is increased, it is observed that in DSR overhead and power consumption of the nodes in the network increase, which in turn drastically reduce the efficiency of the protocol. In order to overcome these effects, in this paper it is proposed to implement overhead reduction and efficient energy management for DSR in mobile Ad Hoc networks.[6]

Multipath routing allows the establishment of multiple paths between a single source and single destination node. It is typically proposed in order to increase the reliability of data transmission or to provide load balancing. Load balancing is of especial importance in MANETs because of the limited bandwidth between the nodes. It also discuss the application of multipath routing to support application constraints such as reliability, load-balancing, energy-conservation, and Quality-of-Service. The multipath routing to support QoS, most of the protocols proposed only provide QoS in terms of specific metrics, such as bandwidth, delay, or reliability. However, it may be necessary to develop mechanisms to support QoS in terms of multiple metrics. For instance, searching for multiple paths that have the required bandwidth, it is desirable to find reliable paths. Given the faulty nature of MANETs, constructing a multipath route that meets the bandwidth requirements while also meeting certain reliability requirements would result in better performance. Also, the mechanisms proposed for supporting QoS in terms of delay only attempt to minimize or improve on the delay. It would be desirable to develop a multipath protocol that can provide delay bounds or guarantees, which are required by some real-time applications. Using multipath routing to provide adaptive QoS using source coding is also a promising technique that can be expanded upon for applications other than video.[7]

III. DISJOINT MODE IN EAOMDV

The E-AOMDV routing algorithm can be divided into node disjoint paths and link disjoint paths. Node disjoint path means there is not two same nodes in these paths. Generally, the number of node disjoint paths is less than that of link disjoint.

3.1. Node-Disjoint Path:

Node-disjoint multipath routing allows the establishment of multiple paths, each consisting of a unique set of nodes between a source and destination.
In node- disjoint paths no node is in common other than the source and the destination.

3.2. Link Disjoint Path:

In link disjoint path multipath intermediate nodes forward RREQ which are received via a different link and with the hop count not to be larger than the first received RREQ. The destination select the route on which it received the first RREQ packet (which will be a shortest delay path), and then it waits to receive more RREQ. The destination node then selects the path which is maximally disjoint from the shortest delay path. If it has more than one maximally disjoint path exists then the tie is broken by choosing the path with the shortest hop count.

IV. ARCHITECTURE

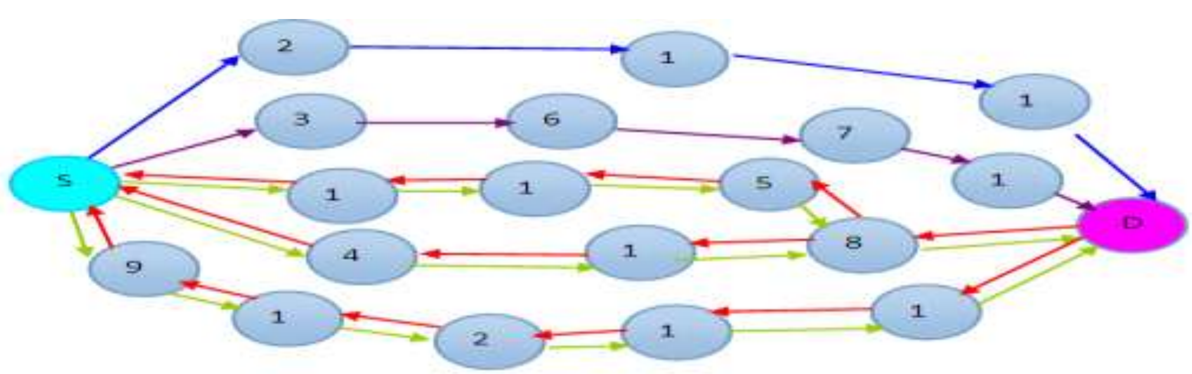

Fig 2: Efficient Alternative Path Selection

Route Recovery Process

Route Request

Route Reply

Efficient Alternative Path Selection based on Routing Load, Hop count and Energy

Normal Path

Efficient Alternative Path

V. MODULES REVIEW

5.1. AOMDV Routing Protocol:

The AOMDV is an on demand routing protocol based on distance vector concept and uses hop-by-hop routing approach to carry out transmission. In AOMDV, route request packet (RREQ) propagation from the source towards the destination establishes multiple paths both at intermediate nodes as well as the destination. Multiple route reply packet (RREPs) traverse these reverse paths back to source at the destination and intermediate nodes. AOMDV guarantees loop freedom and disjoint of multiple paths by formulating certain rules in which every node in the network must observe. In order to maintain multiple paths for the same sequence number, AOMDV uses the notion of an advertised hop count. Every node is required to maintain this variable for each destination. This variable is set to the length of the longest available path for the destination at the time the first advertisement for a particular destination sequence number. The advertised hop count remains unchanged until the sequence number changes. The use of the longest allows more number of alternate paths to be maintained while enforcing the route advertisement rule. Apart from maintaining multiple loop free paths, AOMDV ensures that alternate paths are disjoint so that they are more likely to fail independently. First, confirm that have established connection from destination and maintained multiple routes for alternative option.

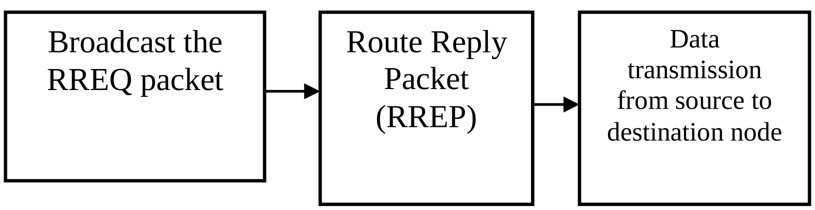

Fig 3: Block diagram of AOMDV routing protocol

5.2 Measurement of Routing Load and Energy:

The process of path discovery gets initiated whenever a node needs to communicate with another node for which no routing information is present in its routing table. Every node maintains two information in its routing table: the routing load and energy for that route. Routing load information based on corresponding source address, destination address and expire time. Routing load means number of flow for example one node involved in the how much routing path that information stored in the routing table. Whenever a source node(S) sends RREQ to its neighbors for route discovery of the destination node (D), the neighbour node should send its energy level REPEL (Reply Energy Level) in response to that RREQ.

i. Energy efficiency = Number of energy efficient nodes / Hop count
ii. When the RREP is sent to the source node each node along the path increases the energy efficient node count if its residual energy is greater than threshold.
iii. Hop count is accessed from the routing table.
iv. Routing load is measured from Routing load structure. Each source and destination pair in which the router is involved is maintained routing load structure of the node.

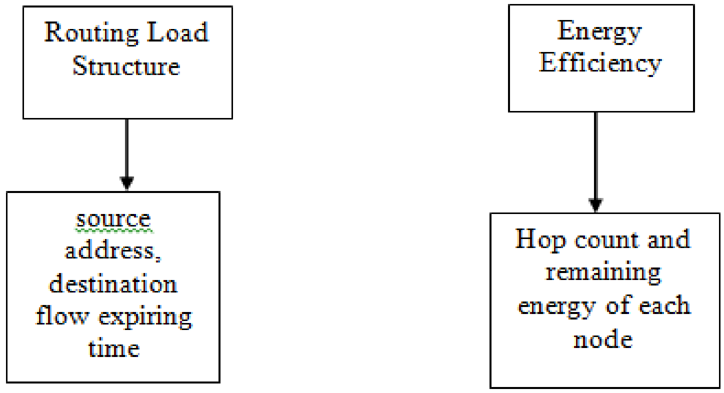

Fig 4: Block diagram of measurement of load and energy

5.3. Data Transmission Over Energy and Routing Load Path :

Whenever a source node(S) sends RREQ to its neighbors for route discovery of the destination node (D), the neighbor node should send its energy level in response to that RREQ, if path to destination node (D) is available. If the path to destination node (D) is not available the neighbor node should send RERR. After discovering the route from source to destination node, source node (S) should consider the neighbor which is having a path to destination node (D) as well as the maximum energy level as its next hop. While selecting the next hop according to the energy levels and routing load, load balancing among the neighbors is achieved. If the current next hop of source is not efficient in terms of energy and routing load. Then the source node sends data to destination through efficient alternative path.

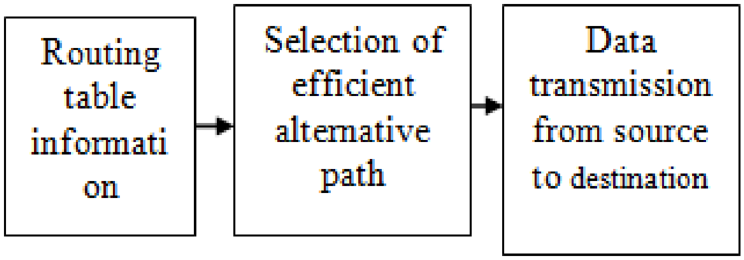

Fig 5: Block diagram of measurement of load and energy

5.4. Selection of Better Disjoint Mode in EAOMDV:

The E-AOMDV routing algorithm can be divided into node disjoint paths and link disjoint paths. Node disjoint path means there is not two same nodes in these paths. The paths not belong to these two are un-disjoint path. Generally, the number of node disjoint paths is less than that of link disjoint.

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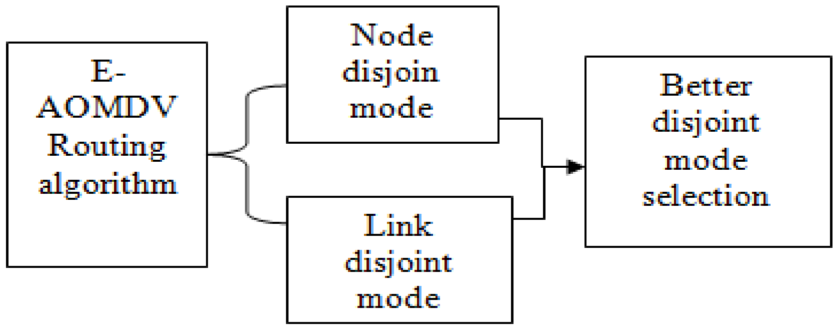

Fig 6: Block diagram of disjoint mode in EAOMDV

5.7 Performance Evaluations:

5.7.1. Routing Packet Overhead:

The routing packet overhead is the ratio of the number of control packets (including route request/reply/update/error packets) to the number of data packets.

5.7.2. Average End-to-End Latency:

Delay is the time taken for a packet to reach the destination from the source node

$$\text{Delay (ms)} = \frac{\sum \text{(Delay of each entities data packet)}}{\text{Total number of delivered data packets}}$$

5.7.3. Packet Delivery Ratio:

Packet Delivery Ratio (PDR) is the ratio of number of packets received and number of packets sends in network.

$$\text{PDR} = \frac{\text{Number of Received Packets}}{\text{Number of Generated Packets}}$$

VI. CONCLUSION

In this paper we discuss about the overview of MANET and discussed how energy conservation, shortest path and load balancing is one of the important constraint for MANET. An energy based routing(EAOMDV) algorithm in a way that optimal route from source to destination can be selected by keeping energy factor as an important parameter. The performance of energy based AOMDV (E-AOMDV) under node disjoint and link mode is evaluated to find better disjoint mode.

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