Comparison of Priority based Energy Efficient Algorithms for Residual Energy Path Selection

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Abstract— MANET in which mobile nodes gently connected without any centralized base station of network. For transmitting data from one node to another node routing protocol used.one of the main challenge in MANET is link breaks between the routes due to energy of nodes having limited battery. Using AODV routing protocol in MANET we select maximum energy path based on threshold. In proposed work how to priority based next path is select based on energy if link or node fail some reasons so reduce link failure.
Key words: MANET, AODV, Residual Energy, Link Failure, Threshold

I. INTRODUCTION

A Mobile Ad-hoc Network (MANET) consists of mobile wireless nodes. This all nodes connected without any centralized base station. MANET is a self-organized and self-configurable network. Node communicates with another node within wirelessly connected area. Nodes are free to move arbitrarily with different speeds due to rapid change in network topology. Additionally, wireless links have significantly lower capacity and transmission range than their hardwired counterparts due to effects of signal fading, noise, and interference conditions. Each node operates as both a host as well as a router, forwarding packets for other mobile nodes.

All nodes in MANET is battery operated. Which means energy efficiency routing is primary basis in designing of these network. Since, it consists of limited battery power, hence energy consumption is a main issue in ad-hoc network Battery failure of a node not only affects that particular node but the whole system is getting affected, as that node forwards the packet in the place of others.

A. Advantages of DSR

- DSR routing protocol include use unidirectional link and loop free routing.
- No need to keep track of routing table at each node because all information saves in header part of packet.
- DSR having multiple routes from source so there is no any periodic updates required every time so less bandwidth require.

B. Disadvantages of DSR

- DSR is not scalable to large network.
- Due to Large packet split the data packet and receiver side not receive packet in proper order.
- Header store path and Path size in DSR require more space so most of time is spent for sending a path to utilize a more bandwidth.
- One node store cache route for multiple destination. So sometimes selected route is broken can possible.

Objective of this paper is improve route maintenance of AODV protocol by using priority based alternate route provide if link fail between nodes.

II. AODV

The AODV protocol is an on-demand routing protocol. AODV performs the route discovery when they node want to send a packet to destination. In AODV a route is discovered by route discovery. All routes are maintained in a routing table till the route expires. Every node within the AODV protocol contains a sequence number. Which is used to find the recent route at the routing discovery. The sequence number is used to find recent route and eliminate loop generation. The AODV protocol has same routing discovery method as the dynamic source routing (DSR) Protocol. But AODV protocol uses different process to Maintain and manage a routing table. The routing table of nodes in DSV protocol maintains all the route information from sender to destination but in AODV protocol have less information, that stores the destination address, next hop node address and destination sequence number. Every entry of a routing table contains a lifetime i.e. time to live (TTL) field. A row in the routing table is removed when the TTL period expires. In AODV protocol, nodes periodically exchange HELLO routing messages for check the neighbor available or not. When source nodes need to send packet to destination node, it checks its routing table. If routing table in source node has active entry to destination it sends the packet to destination using active route else it broadcasts RREQ (Route Request) packet. On receiving RREQ packets intermediate neighbor nodes increments the hop count by one and broadcasts the packet till it reaches the destination node. The intermediate neighbor nodes send a RREP (Route Reply) packet to source node in receiving RREQ packet. The destination node receives many RREQ packets from different routes. The destination node chooses the route with least hop count and sends a RREP packet to the source node. An intermediate node on receiving RREQ packet, updates the information of node sending RREQ packet so as to determine forward path of sending packet. The routing table updating continues till RREQ reaches destination or route to destination is found. When the RREQ reaches destination it sends RREP packets to the source. Every node maintain two counters: Sequence number: work as a time stamp Broadcast id: increment whenever the source issues a new RREQ

Source broadcast RREQ packet for searching route:
<source_add,source_sequence#,broadcast_id,dest_add,
dest_sequence#,hop count>

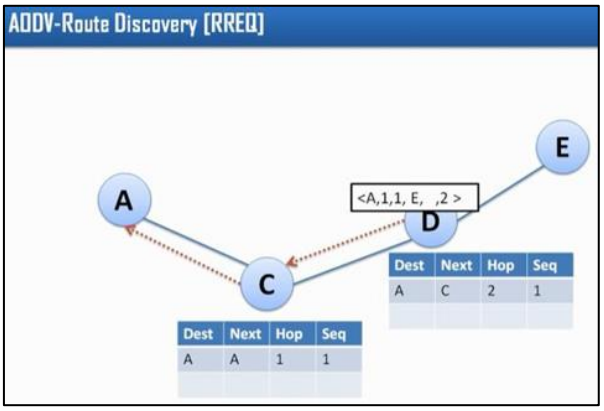

Fig: 1: AODV Route Request [11]

Destination replies using RREP unicasting: <source_add, dest_add , dest_sequence# , hop count ,lifetime>

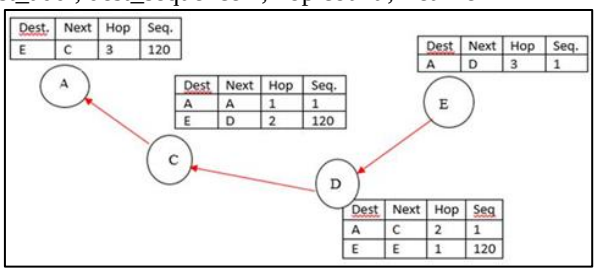

Fig: 2: AODV Route Reply

A. Advantages of AODV

- AODV responds very quick when topological changes that affects the active route, because its adaptability to very highly network
- AODV can support both unicast and broadcast packet transmission.
- AODV has lower setup delay for connection and detection of latest route to the destination.
- AODV is flat routing protocol that not required central authority to handle all responsibility.

III. Related Research Work

If less energy of node select than packet dropping occure.so link failure occur. This scheme does not cause link failure problem and avoid rebroadcast message again from source node.so more energy consumption occurs. This gives a significant improvement in node energy. [1]

These paper presents a modified AODV algorithm, where node select the best path based on total energy path. During RREQ packet each node add its residual energy to the packet and forward until destination. RREQ packet copied RREP packet. RREP packet send through reverse same path as RREQ. [2]

Energy Aware Routing Protocol (AODVEA) routing based on max min energy algorithm to increase the lifetime of the network. Find both minimum and maximum energy path. Select best one. Modified AODV (AODVM) which incorporates same local forwarding decision for intermediate nodes but routing is based on combination of max min energy algorithm and shortest distance. Use hop count.[3]

The protocol that is proposed in this paper integrates the concept of drain count into AODV in order to make it energy efficient. If the energy of a node is lesser than the set threshold energy, then the drain count value of the path is incremented by a factor of 1. The path that has the least drain count, i.e. the path which has least number of nodes having energy below the threshold energy, is chosen from among the paths that are traversed by the first few control packets that arrive at the destination node. This ensures that a path with a reasonably short distance is chosen. [4]

EERP is proposed for this purpose which is based on AODV. The protocol reduces the transmission power of a node which is part of an active route if next hop node is closer. The distance between two consecutive nodes is calculated based on RSS (received signal strength) from next hop during the route reply process. If the RSS is high, it implies that nodes are closer; as a result lesser transmission power will be required to send data. This in turn reduces battery consumption.[5]

In proposed method every node check its residual energy if it is less than or equal to threshold than node notify to their upstream node insufficient energy so node is no more transmission can do. So path link failure reduce.[6]

In proposed system route discovery based on residual energy and hop count. For consider battery cost use minimum battery cost routing (MBCR). But this algorithm considers abstract of value if battery of battery cost function, thus routes containing nodes with slight remaining battery capacity may be selecting resulting in early network failure. [7]

In the AODV routing protocol, whenever a link breaks an error message send to source indicating the link failure and further communication is stopped temporarily. This protocol proposes an improve AODV routing protocol by if link failure occur then data packet is send through alternate route instead of dropping it. By adding two extra field in data packet BID (backward id) and Backward hop count (BHC). [8]

In proposed system maximize the network lifetime by applying an energy mean value algorithm which consider energy aware. RREQ message is send then RREP not directly send wait for 3*NODE_TRAVERSAL_TIME and calculate energy mean value by dividing hop count of whole path.

All reply path node having energy mean value. If new path alters then remaining energy is less then mean energy so delay time of request message set 0.05ms otherwise set 0.5ms. [9]

AODV and DSR routing protocol for check performance metrics in study include packet loss, energy consumption, throughput, packet delivery fraction, average end to end delay. Using NS2 simulator. [10]

IV. Problem Statement

- Selected Maximum residual energy selected path in link failure occur due to bandwidth problem, processing power, mobility.
- No any alternate path is available due to link failure.
- Destination to source select same path as source to destination. RREP packet due to less energy of path chances of link fail possible.

V. CONCLUSION

An ad hoc network is a collection of nodes which arbitrary way with free different speed and change continuous topology. This work of proposed system is focus on residual energy path selection improvement. In AODV protocol selected residual energy path having link failure problem occur then select another path which having maximum residual energy, Destination to source select another route in MANET.

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