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ENHANCED DSR AN EFFICIENT ROUTING PROTOCOL FOR MANET

Ms. P. A. Madnaik[1] & Prof. Mrs. P.P. Belagali[2]
[1]ME, E&TC Engg, JJMCOE, Jaysingpur
[2]Associate Professor of E&TC Engg, JJMCOE, Jaysingpur

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ABSTRACT

In this paper we modify the DSR protocol for energy consumption and also study the comparison of various routing protocol. DSR protocol is on demand source routing protocol .source routing means when source initiate route discovery process then It finds routes from source to destination .but in DSR more energy consumption. To modify the mechanism of DSR for route selection procedure.In this paper we propose EDSR protocol which reduces the total energy consumption in the network by selecting minimum energy consuming path. It is simulated in NS2 and visualize by nam (network animator).

Keywords: routing protocol, mobile ad-hoc networking, DSR, EDSR energy consumption.

I. INRTODUCTION

Ad-hoc-network is wireless network where each node communicates with each other. Each node in the network as forwarding and receiving packet. Due to this all nodes are considered as router. The main goal of such Ad-hoc network routing protocol is to find suitable route between pair of node to consume the less energy among the nodes and maximize the network lifetime. In this paper to modify packet structure of DSR protocol to achieve desired mechanism.

Mobile ad hoc networks can be used in many applications, ranging from sensors for environment, Military scenarios, vehicular ad hoc communications, Rescue operation, data network, road safety, health, home, peer-to-peer messaging, Free Internet Connection Sharing, and Sensor Network, air/land/navy defense, weapons, robots, etc.

II. ROUTING PROTOCOL ENERGY EFFICIENCY IN MANET

Routing protocol is used to discover routes between nodes there by communication within network. The main goal of such an Ad-hoc network routing protocol is establish efficient route between pair of node. In this way message may be delivered .A large number of protocol are available for this purpose. Routed protocol is provide sufficient information in its network layer address to allow a packet to be forwarded from host to host based on the addressing scheme. They give the format and use of the fields within a packet. Packets are generally conveyed from end system to end system. IP (Internet Protocol), Telnet, RPC (Remote Procedure Call), SNMP, SMTP are examples of routed protocols.

Each routing protocol has some specific domain and purpose in which this is used. This are some aspects that should take into consideration that is Network size/scalability, Limited physical security , existing routing protocols, Geographical area, Energy-constrained operation, Quality of service, existing routing protocols. Routing protocol are categorized in main three categories. A] Table Driven Protocols. B] On Demand Protocols. C] Hybrid Protocols.

The Table Driven Routing Protocol, also known as Proactive Protocols , Each node uses routing information to store the location information of other nodes in the network in routing table and this information is then used to move data in to different nodes in the network. DSDV are the examples of a Table Driven Protocol. On Demand Routing Protocol, also known as Reactive Protocols When They are required to route data packet by a source node to a destination for which it does not have route information, then route is established by a route discovery process which goes from one node to the other until it arrives at the destination or a node in between has a route to the destination. AODV and DSR are the Example. Hybrid Routing Protocols: Hybrid routing protocol this is combination of Table Based Routing Protocols with On Demand Routing Protocols. They use distance vectors

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algorithm to find the best paths to destination networks and when there is a change in the topology of the network report routing information immediately. Each node keeps a record of routing information for its own zone and the size which is defined by a zone radius, which is defined by a metric such as the number of hops.
Tables:

Table no1.Comparison of various routing protocol

Sr.no	AODV	DSR	DSDV
1	It is on demand that is Reactive Protocol	It is also on demand that is Reactive Protocol	It is table driven that is Proactive Protocol
2	In AODV routing table maintains one entry per destination.	In DSR routing table maintains multiple route cache entries for each target	In DSDV routing table is maintain and periodic routing update are transfer even if routes are not necessary
3	It has low end to end delay	It has low end to end delay	It has high for Pause time 0 but it starts decreasing as time increases.
4	It performs better for larger number of nodes	It performs better for larger number of nodes	It performs better for few number of nodes
5	For real time traffic AODV is preferred	For real time traffic DSR is not preferred	For real time traffic DSDV is not preferred

Selected Protocol: Dynamic Source Routing

DSR is simple and efficient a popular flat on demand reactive ad hoc routing protocol. One of the primary characteristics of DSR is that it is strictly source routing protocol that means data packets contain strict source routes that specify each node along the path to the destination. Source routes collect Route request (RREQ) and route reply (RREP) packets so that once a route is discovered, the source learns the entire source route and can place that route into subsequent data packets The basic mechanism of DSR includes route discovery and route maintenance.

a. Route Discovery

This is the mechanism in which whenever node send data to destination node which is not in transmission range therefore it first find route to that node by launching the Route discovery mechanism. Figure shows the Route discovery mechanism. Normally the sender must first search this route in its route cache if there is no route it precedes as follow:

- It creates a route request packets containing its address and the address of the destination node then it broadcast this packet to all its neighbors using flooding.
- Each neighbor when receiving this request consults its cache to find suitable route to this destination to be returned back to the sender otherwise it rebroadcast the same route request to all its neighbors after adding its address to the header of the route request and learns from this request information to be added to its cache. If the node has already treated this route request it ignores the new received request by verifying its sequence number since each route request is identified by a unique sequence number. The

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same procedure is executed by each neighboring node until the route request arrives to destination which adds

b. Route Reply

Figure shows the Route reply mechanism. This procedure is executed by a node after receiving a route request destined to him thus this node executes the following actions:

- For future use adds this new route to its cache.
- The header of DSR packets adds it address at the end of the path.
- Replies to this request using unicast along the path contained in the header.

c. Route Maintenance

When forwarding a packet each intermediate node is responsible for the packet is correctly received by the next node, but some situation like dynamic topology where a node doesn't receive the acknowledgement of reception from link layer of a given packet, therefore it resends the same packet it until reaches a predefined value of attempts. Whenever this number of attempts was reached this node consider this link as broken than it deletes each route containing this link from its cache than it generates a route error packet to inform the source node and all intermediate nodes about this link failure so in the same way each intermediate node deletes all routes containing this route until the route error packet arrives to its destination to find a new route in its route cache.

d. Route Cache

The route cache in DSR is used to save the frequently used routes in order to avoid new route discovery mechanism which consumes lot of network resources, a node can also learns from route request to adds new routes to its cache it also learns from route error packets to update its cache.

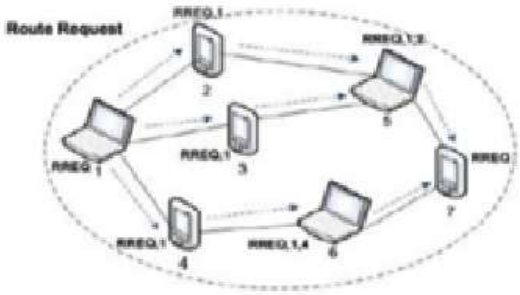

Fig a: Route Request

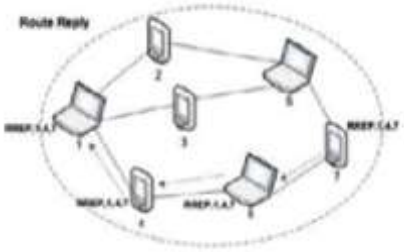

Fig b: Route Reply

III. PROPOSED METHOD

We have proposed an Energy Efficient Dynamic Source Routing (EDSR) protocol which is based on Transmission power control approach and Load balancing approach. To reduce the transmission energy we are using a hop-by-hop power control mechanism and for load balancing it will select the nodes which is having the least remaining power. Here during the route discovery phase itself we are calculating the minimum energy required to communicate to the node which sends the request to it. At the same time we observe each nodes remaining power to avoid a route which is having a tendency to die out. The destination node will make a decision about the selection of best route among the multiple requests that reaches to it and sends reply packet to the destination

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through the selected route. In this way the minimum energy routing protocol is designed and implemented by making changes in the minimum-hop fixed-transmit power version of DSR.

IV. SIMULATION AND PROCEDURE

NS-2.34 is open source discrete event simulator provides considerable support for simulation of TCP, routing, multicast protocols over wired and wireless (local and satellite) networks, etc. It uses Tcl and Object Tcl shell as interface allowing the input file (simulation script) to describe the model to simulate and C++ core methods used. Users can define arbitrary network topologies composed of nodes, routers, links and shared media. A rich set of protocol objects can then be attached to nodes, usually as agents. To analyze the trace files, other independent tools will be needed to filter, compute and display the result example-awk, matlab etc. Animated simulation can be run by nam (Network Animator) and Trace file can be used for Analysis.

V. IMPLEMENTATION AND RESULT

Table No.2- Parameter used.

Simulator Used	NS-2
Protocol under test	DSR,EDSR
Node	10,20,50,60,240
Simulation time	1000
Traffic type	CBR
Packet size	512 byte

Scenario 1: Simulation of DSR protocol with different node.
The simulation scenario for The different node densities that is 10,40,70,90 nodes shown in figure a, c, b ,d

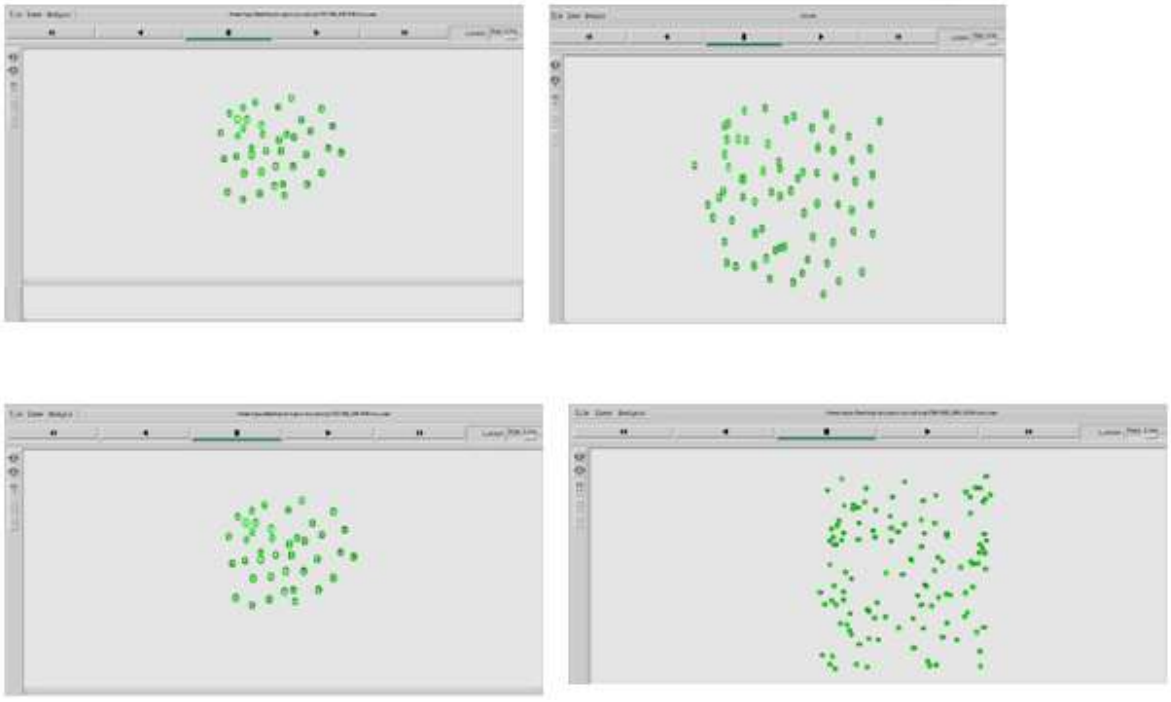

Fig a, c, b, d: simulation of 10,40,70,90 nodes

Scenario 2: Average Energy consumption.

ISSN: 2277-9655
Impact Factor: 5.164
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Table No.3- Average Energy consumption value

Energy		
Node	DSR	EDSR
10	41.8	37.62
20	62.06	55.85
30	99.54	90.39
40	84.61	70.24
50	98.95	56.75
60	79.57	71.62
70	85.69	85.69
80	132.86	119.58
90	135.16	119.58
100	610.633	402.65
120	610.633	598.12
160	610.633	598.12
200	610.633	598.12
240	610.633	598.12

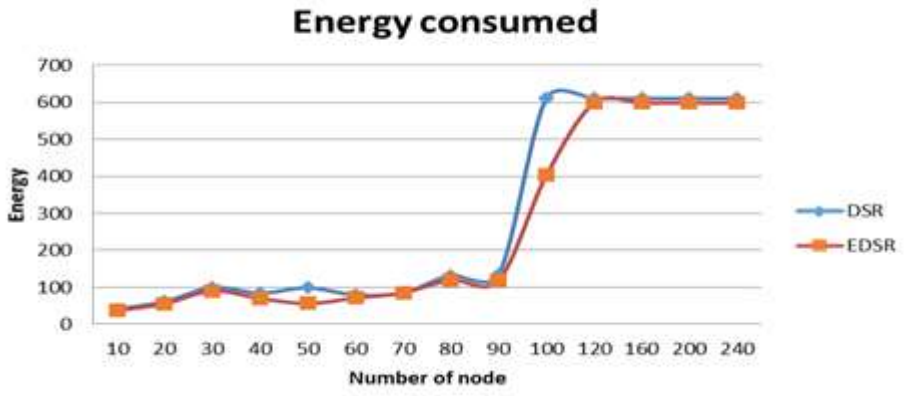

Fig: Average Energy consumption of various node

Average energy consumption is the ratio of total energy consumed by all the nodes in the network by the number of nodes. The figure shows the graph of average energy consumption vs. number of nodes and the nodes in EDSR will consume less energy as compare to the nodes in DSR. The green line shows the average energy consumption of DSR and red line shows the average energy consumption of EDSR on different number of nodes. We compare the values of average energy consumption on different number of node.

VI. CONCLUSION

EDSR protocol for ad-hoc networks works fine, but it runs under some assumptions. This implementation works fine with less number of nodes, when the number of nodes increase then due to no much functionality in send buffer we face lot of problems like upper layers start to retransmit the packet again when it does not get an acknowledgement for the packet. In future implementations if these optional features are implemented then this implementation can be used for real ad hoc network .

In designing the routing protocol there are lot of problem but Energy efficiency is the main problem. Modifying the DSR protocol less energy consumed.

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