ENERGY MODEL AND LINK STABILITY USING AODV IN MANETS

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ABSTRACT: An approach is made to enhance the effectiveness of energy utilization that increases the total network life span of MANETS (Mobile Ad-Hoc network)by using an Efficient Energy AODV. Parameters like consistency, survivability and self nourishment of the network are of utmost importance for MANETS which are deployed in various fields. In such an environment link breakage occurs due to the following primary reasons: firstly, a node switching off due to energy drains out and secondly, a node moving away of the communication range from its neighbouring node. The proposed energy valuable routing protocol for MANETS tries to trim down energy utilization by using a routing protocol that improves energy exploitation. This leads to an energy effective model while selecting the routes. Thus, it is additionally wished to use a supplementary metric that takes stability and availability of a particular link in to consideration. The approach in this paper utilizes two additional features namely 'Link Stability Parameter' and 'Energy Model' in the packet header. These two metrics are paramount in routing table calculation.

KEYWORDS: Residual energy (Remaining Energy),AODV (Ad Hoc On-Demand Distance Vector),Energy Efficient AODV

I. INTRODUCTION

The total residual or leftover energy in a MANET is a prime concern for present day scenario. It is calculated by subtracting total energy consumption by the node from its initial energy level. There are diverse routing protocols while selecting transmission of data packets from a particular source to a destined site. Other than packets transmission and reception, forwarded packets and drops are also to be considered[5].The various node parameters along with the node's left over energy are used as routing selection variables. The packet moves from source and reaches its final destination using the concerned algorithm[3].In the present approach, the selected network path might not resemble the exact path of least energy. The maximum remaining energy of nodes will determine the best path together. A dedicated protocol is required for lifetime maximization of the network which differs from minimum or lowest energy routing method. In case of minimum or lowest energy path, network is failed due to over congestion and rapid battery draining. However, choice of route by highest residual energy of nodes gives an outcome in increase in network lifetime by considering least node pack throughout the entire route.

II Design Objectives

While designing a new approach, two important perspectives of routing i.e. lowest overall energy burning and increase in life span of the network may sound like a matter of conflict. For an example of easy understanding a case, it is considered that a common node is present on numerous paths consisting of various other nodes, and in real time the battery energy of this vital node rapidly runs out. As inevitable consequences, the lifespan of the network is shortened. To implement this routing path, the on hand routing protocol optimizes the path with the lowest number of calculated hops. For Energy Efficient AODV, the effective path chosen is dependent on residual energy. First, each node is checked for initial residual energy level, Secondly lowest left behind energy of a participating node is checked on a finite and particular path. Finally the path is chosen which has maximum of least residual energy.

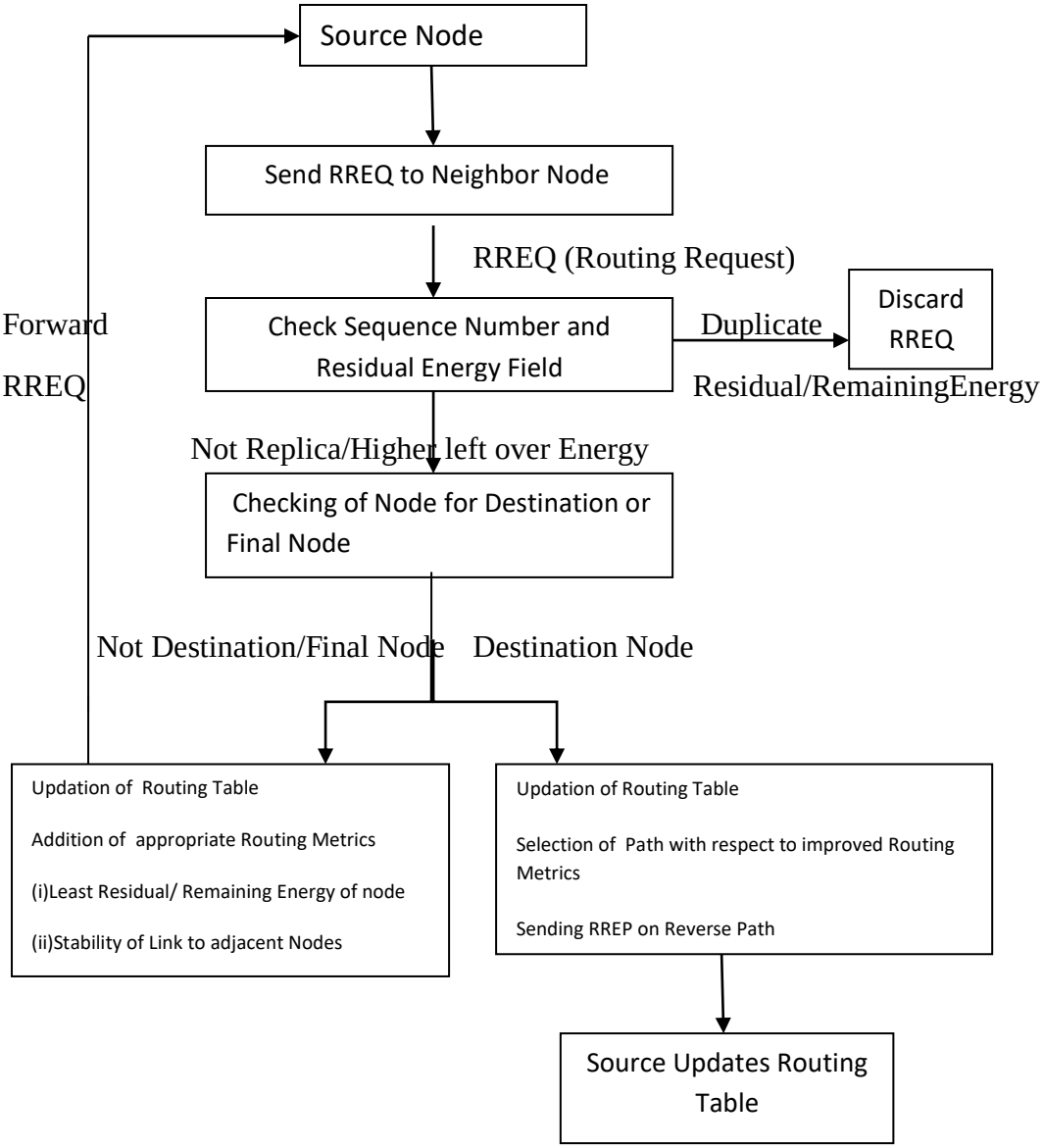
The main aim to introduce energy metric is to obtain improved lifetime of network where minimization of change of residual energies of nodes are considered. In this methodology a load matching approach is maintained [18]. Here avoidance of power/traffic packed paths and selection of less traffic mode paths are implemented. This helps Energy Efficient AODV (Routing Protocol for energy effectiveness) achieve a lesser amount of variation in energy levels of different poles apart nodes in the operative network which in turn maximizes the total network lifetime. Network Simulator version2 commonly known as NS2 software helps to execute all the required simulations and

display minute details for AODV and futuristic Energy Efficient AODV routing protocol which is inspired by AODV protocol.

IIIFLOW CHART AND PROPOSED STEPS

The routing method of Energy Efficient AODV protocol:-

FLOW CHART:



Steps to develop simulation Results on NS2 Software:

Step1: This script is created by NSG2 beta1
Step2: Simulation parameters setup
Step: 3 create an ns simulator
Step: 4 Setup topography object
Step: 5 open the NS trace file application
Step: 6 opening the NAM trace file application
Step: 7 Creation of wireless channel
Step: 8 Agents Definition new Agent/UDP or new Agent/Null
Step: 9 Choosing CBR Application in place of UDP connection
Step: 10 define a finish procedure

IV Simulation Outline

The simulation was optimized according to characteristics of MANET deployed along remote areas/minimum infrastructure scenario, where sensor/source nodes are addressed at the periphery of concerned network[17]. These nodes send data to control server/servers through multiple mobile nodes in real time scenario. Number of vital nodes addressed from40 to 80.

Table 1: Simulated model parameters

Parameters	**Description**
Channel	Wireless Channel
Propagation	Two Ray Channel
Antenna	Omni directional Antenna
Terrain region	1500 m x 1500 m
Simulation Time period	60 s
MAC Type	802.11
Application model of Traffic	CBR
Routing Protocol	AODV
Data Pay load	512 Bytes/Packet
Number of Nodes	25
No of Destined/Final Control Nodes	1
Initial Energy Level of Nodes	100,00 Joules
Transmit Power	2.0 Watts
Receive Power	1.0 Watts
Idle Power	0.5 Watts

V Simulation Results

The simulated energy consumption and determination are accomplished using AODV and Energy Efficient AODV routing protocols for typical MANET where25 nodes can be observed.The red and green line stand for AODV and Energy Efficient AODV(shortened as NAODV)respectively.

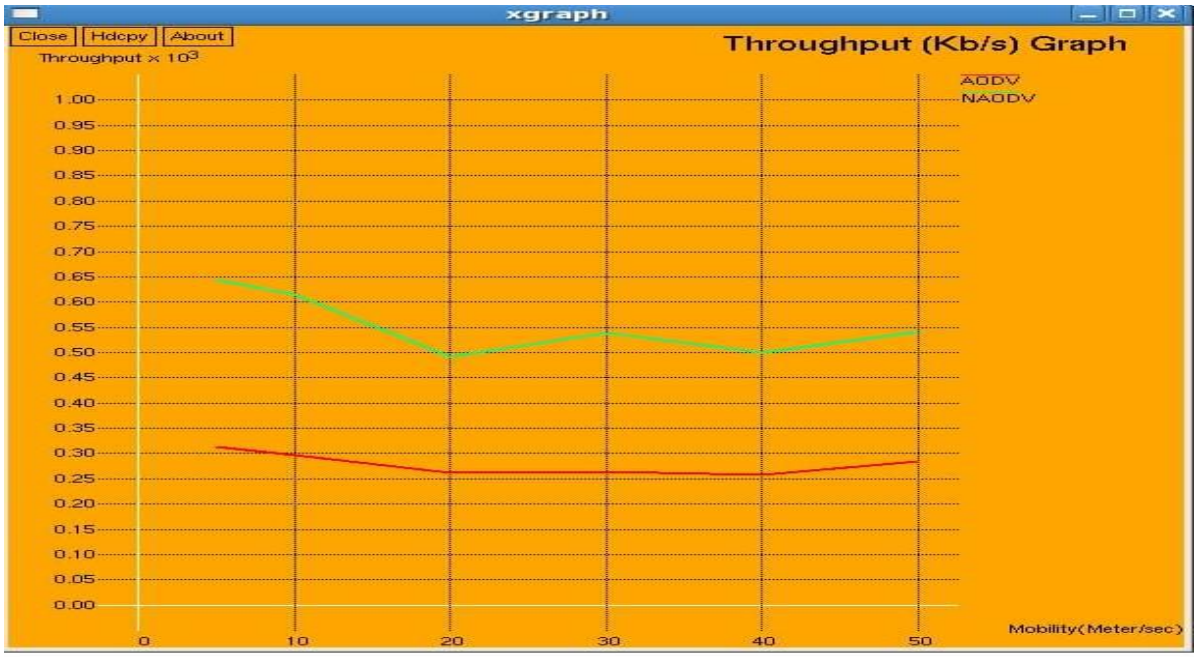


Fig 1: Energy Efficient AODV(marked as NAODV) V/S AODV Throughput analysis at node 25

Fig 2: Energy Efficient AODV(marked as NAODV)V/S AODV Packet Delivery Ratio analysis at node 25

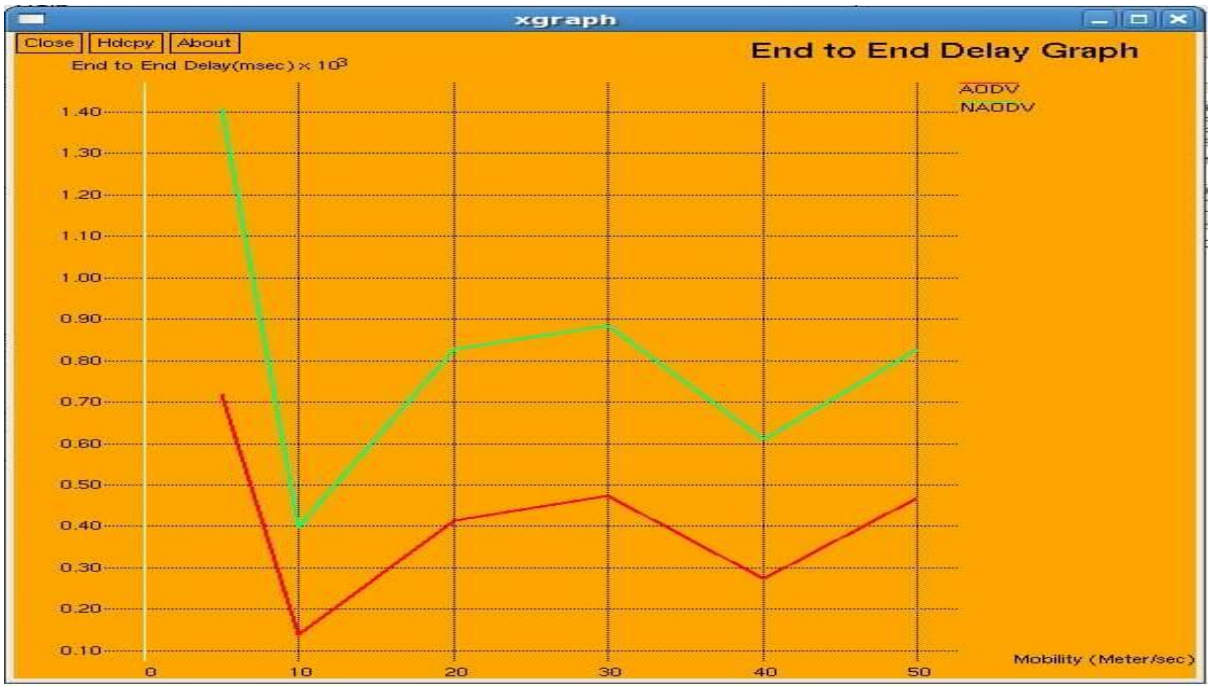


Fig 3:Energy Efficient AODV(marked as NAODV) v/s AODV End to End Delay analysis at node 25

Table 2: Comparison between Energy Efficient AODV and AODV parameters

S.N.	Parameter	Energy Efficient AODV	AODV
1	Number of Packet Sent	27728	5626
2	Number of Packet Receive	14805	1247
3	Number of Packet Drop	12834	4376
4	% Packet received	14805/27728= 53.39%	1247/5626= 22.16%
5	% Packets dropped	12834/27728= 46.28%	4376/5626= 77.78%

Table 3: Comparison of performance (Throughput) between Energy Efficient AODV and AODV

S.N.	No of Nodes	Throughput(Kb/s)		Improvement Factor (b/a)
		(a)AODV	(b)Energy Efficient AODV	
1	10	0.240	0.510	0.510/0.240=2.125
2	15	0.340	0.690	0.690/0.340=2.029
3	20	0.260	0.540	0.540/0.260=2.076
4	25	0.310	0.650	0.650/0.310=2.096
5	30	0.340	0.670	0.670/0.340=1.970

Table 4: Comparison of performance (Packet Delivery Ratio) between Energy Efficient AODV and AODV

S.N.	No of Nodes	Packet Delivery Ratio		Improvement Factor (d/c)
		(c)AODV	(d)Energy Efficient AODV	
1	10	0.50	1.20	1.20/0.50=2.411
2	15	0.75	1.65	1.65/0.75=2.235
3	20	0.60	1.25	1.25/0.60=2.082
4	25	0.70	1.54	1.54/0.70=2.200
5	30	0.65	1.52	1.52/0.65=2.338

From above tables it can be realized that for a fixed number of nodes, Energy Efficient AODV's results are better with improved performance than AODV in respect of Throughput and Packet Delivery Ratio where the improvement factors are almost twice. In case of end to end delay Energy Efficient AODV lags behind. Further the video simulation shows Energy Efficient AODV network with dynamic nodes lasts more than the AODV network with dynamic nodes (display data not shown).

VI Conclusion

After comparing Energy EfficientAODV and AODV, the performance of dynamic nodes[16] is observed to be better in respect of throughput and packet delivery ratio parameters where the improvement factors are more than twice in most cases in Energy Efficient AODV and also network lifetime is more. Hence Energy EfficientAODV can be implemented with the improved routing performance parameters in terms of throughput and packet delivery ratio.

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