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An Adaptive Hello Messaging and Multipath Route Maintenance in On-Demand MANET Routing Protocol

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ABSTRACT: In *mobile ad-hoc networks, local link connectivity information is extremely important for route establishment and maintenance. Periodic Hello messaging is a widely-used scheme to obtain local link connectivity information. However, unnecessary Hello messaging can drain batteries more quickly. In this paper an adaptive Hello messaging scheme to reduce unnecessary Hello messages has been proposed. Simulation results show that the proposed scheme reduces energy consumption and network overhead without any explicit difference in throughput.*

***Keywords*:** *Hello messaging, ad hoc routing, network overhead, local connectivity, energy saving.*

I. INTRODUCTION

MANET [1] is a wireless infrastructure less network having mobile nodes. Communication between these nodes can be achieved using multi hop wireless links. Each node will act as a router and forward data packets to other nodes. Mobile adhoc networks are operating without any centralized base station. It uses multi hop relaying. Since the nodes are independent to move in any direction, there may be frequent link breakage. The advantage of MANET is its instant deployment.

MANET routing protocol(e.g., Ad hoc On-Demand Distance Vector (AODV) [2], is used, where a new path is discovered through Route Request (RREQ) and Route Response (RREP) packet exchanges. Route maintenance of active routes in AODV is done by continuous monitoring of link status of next hops. HELLO messages as sent periodically to the neighbor node to check whether the link exists. A RERR message is sent upstream to source node when alink failure is noticed. Source finds an alternate route to the unreachable nodes by reinitiating the route discovery [2].

AOMDV is a multi path routing protocol based on AODV. It extends AODV by computing multiple paths to destination during route discovery itself. New route discovery is required only when all the existing alternate paths fail. This improves the delay and data loss incurred by AODV during link failure [3].AOMDV ensures loop freedom in multiple paths. Instead of rejecting each copy of RREQ like AODV, in AOMDV a duplicate RREQ is accepted as an alternate route if it is coming from a different neighbor.

AOMDV uses the notion ‘advertised hops’ which means maximum hop count to a destination to avoid loops [3].Each intermediate node in an active route stores list of next hops. AOMDV provides link disjoint paths. Destination will reply to multiple RREQs only if they are coming from unique nodes [3].AOMDV has to keep multiple paths in the routing table instead of a single route as in AODV. But selection of alternate route on link failure should not initiate a new route discovery. An alternate path can be selected quickly from the next hop list without much data loss. HELLO messages are flown to use to check the liveability of other routes. When there is no path available from source to destination then route discovery process again start.

In this paper, we propose an adaptive Hello messaging scheme for neighbor discovery by effectively reduce unnecessary Hello messages. Simulation results show that our proposed scheme suppresses unnecessary Hello messaging and reduces the energy consumption up to 20% without any additional delay.

II. DESIGN OF AN ADAPTIVE HELLO MESSAGING INTERVAL SCHEME

The source node send Hello Packets is responsible for establishing and maintaining neighbor relationships.[4] It also ensures that communication between neighbors is bidirectional. Hello packets are sent periodically to out all the network router interfaces. Bidirectional communication is indicated when the router sees itself listed in the neighbor's Hello packet.

The Hello packets are sent out each functioning router interface. They are used to discover and maintain neighbor relationships. But due to this periodic HELLO messages, the node's battery drains more quickly, In this paper an adaptive HELLO messaging scheme for neighbor discovery that avoids the unnecessary energy utilization. In this scheme, the unwanted broadcasting of HELLO packets are reduced. The method estimates an average time gap between two consecutive events (sending or receiving a data packet) on a node.

Interval between two events = previous event end time-current event start time

By monitoring the event intervals, the scheme estimate how actively a node is involved in sending or forwarding. Initially the source node send Hello Packets, If the link is available then Calculates the interval between two events and Broadcast hello packet within the interval. Otherwise the node broadcast hello packet to check the link availability.

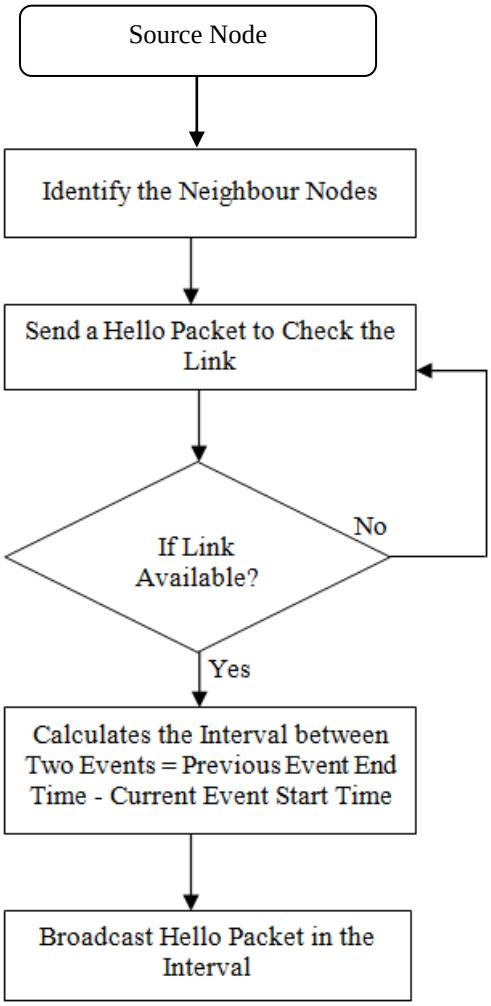

Fig1. Flow diagram for adaptive hello messaging scheme

III. RESULTS AND DISCUSSION

The Simulation is carried out in NS2 under LINUX platform. The aim of these simulations is to analyze the AODV protocol by comparing it with AODV-AH for its efficiency in terms of energy consumption, delay, and throughput. A new protocol is designed based on AODV-AH so that the new protocol had better performance than AODV in all the above parameters. The following table shows that the important parameters chosen for the NS2 simulation:

Table 1 Simulation Parameters

PARAMETER	VALUE
Simulation Time	100s
Channel type	Wireless channel
MAC Type	MAC 802.11
Radio propagation Model	Two Ray Ground
Antenna	Omni Antenna
Topology Size	1000m x 1500m
Routing protocol	AODV,AODV-AH
Number of nodes	50 , 100, 150, 200
Traffic type	CBR

3.1. Simulation parameters

1. Energy consumption: This is the ratio of the average energy consumed in each node to total energy.
2. End to end delay: This is the ratio of the interval between the first and second packet to total packet delivery.
3.Throughput: The throughput metric measures how well the network can constantly provide data to the sink. Throughput is the number of packet arriving at the sink per ms.

3.2. Simulation Results

The following two tables show the performance result of simulation of AODV and AODV-AH for various parameters. The tables show AOMV-AH has better throughput, energy consumption**,** average end to end delay for number of nodes. For all other cases AODV-AH has better result for the above parameters.

Table 2. Simulation results for AODV

NUMBER OF NODES	THROUGHPUT	AVERAGE END TO END DELAY	ENERGY
50	19789	1.8608	60
100	21789	1.2434	56
150	23111	1.5092	43
200	26026	1.8919	30

Table 3. Simulation results for AODV-AH

NUMBER OF NODES	THROUGHPUT	AVERAGE END TO END DELAY	ENERY
50	24387	0.5517	75
100	25688	1.1467	63
150	26561	1.4742	52
200	33702	1.5132	47

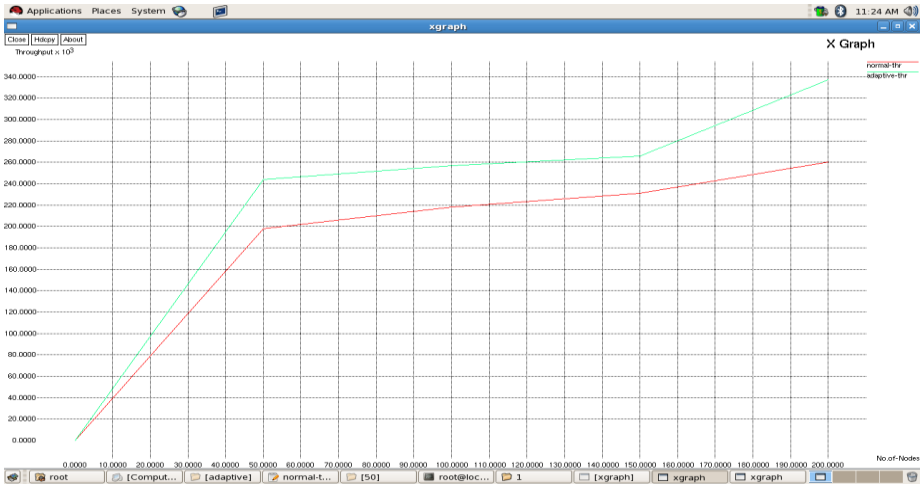

Fig 1. Comparison Of Throughput Versus No Of Nodes For AODV,AODV-AH

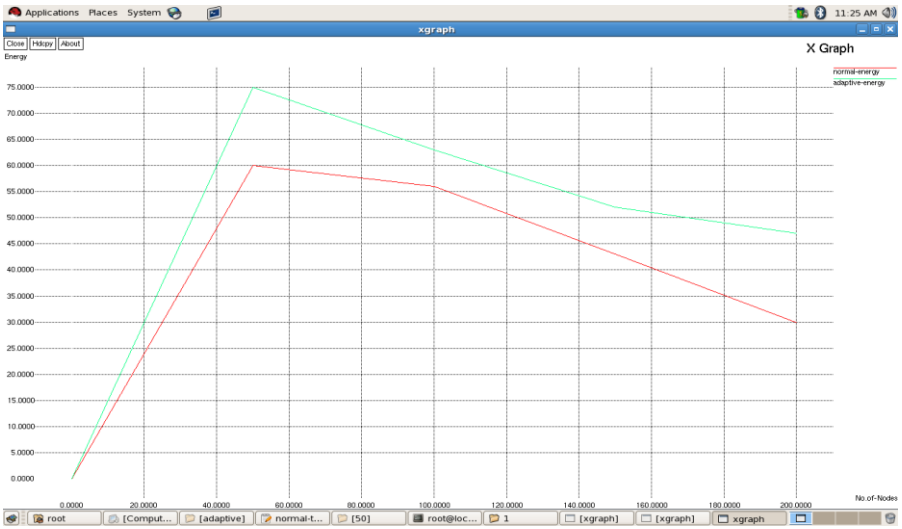

Fig 2. Comparison of Energy Consumption Versus Number Of Nodes For AODV, AODV-AH

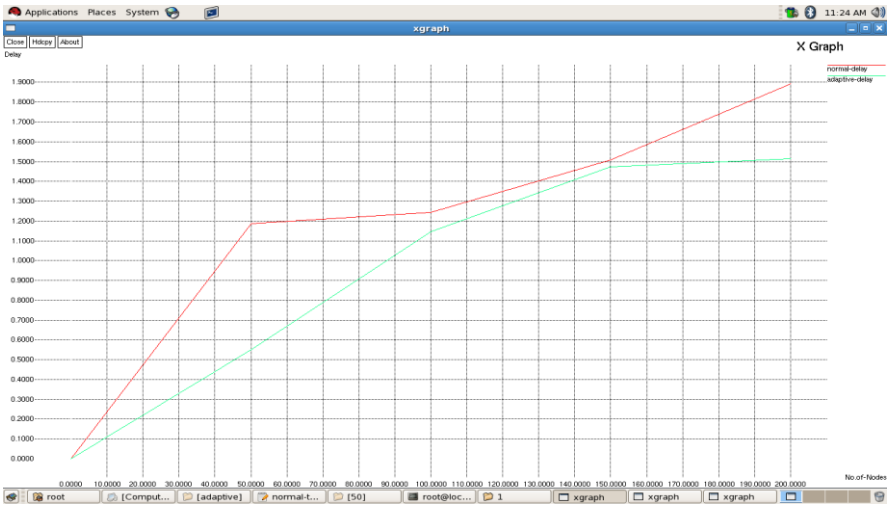

Fig 3 Comparison Of Delay Versus Number Of Nodes For AODV,AODV-AH

IV. Conclusion And Future Enhancement

In this paper, we proposed an adaptive Hello interval to reduce battery drain through practical suppression of unnecessary Hello messaging. Based on the event interval of a node, the Hello interval can be enlarged without reduced detectability of a broken link, which hidden energy consumption. In future we enhancement Multipath routing use AOMDV protocal with adaptive Hello messaging scheme needs the link availability information and establishment of multiple paths between a single source and single destination node. Energy efficient Multipath routing algorithms use route selection criterion to choose the best path from available multiple paths.

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