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ADHOC ON DEMAND DISTANCE VECTOR-UPPSALA UNIVERSITY ROUTING PROTOCOL BASED ENERGY EFFICIENT ADAPTIVE FORWARDING SCHEME FOR MANET

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Abstract— Flooding is the simplest way of broadcasting, in which each node in the network retransmits an incoming message once. Simple flooding technique in MANET causes the broadcast storm problem. In the proposed method, AODV-UU protocol is used instead of AODV protocol. This protocol provide the efficient way of packet transmission so unnecessary retransmission is avoided and size of the packet is reduced. In addition to the previous works, the proposed protocol divides the network into different cluster based on their transmission-power levels. One node can choose a gateway node. The gateway node can efficiently forwarding the RREQ packet to the destination node. The redundant retransmission is avoided and also time is saving for forwarding the packet to its destination. Therefore the proposed Protocol shows the efficient throughput compared to AODV protocol.

Keywords-AODV-UU, Gateway Node, MANET, Retransmission, RREQ packet.

1. INTRODUCTION

A mobile ad-hoc network is a self configuring infrastructure less network of mobile devices connected by wireless links. Each device in a MANET is free to move independently in any direction, and will therefore change its links to other devices frequently. Each must forward traffic unrelated to its own use, and therefore be a router. The primary challenge in building a MANET is equipping each device to continuously maintain the information required to properly route traffic. MANETs have been receiving serious attention over the recent years due to their vast potential in both military and civil applications [2]. The intermediate nodes between source and destination play a significant role in forwarding the control packets. This flooding mechanism is fundamental to the route discovery process. However, flooding can be redundant and energy consuming.

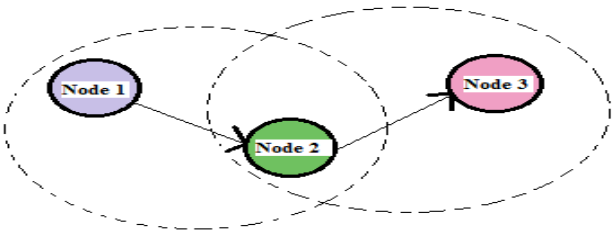

Figure 1.Diagram of MANET

Therefore, many attempts were made to restrict retransmission of control packets to minimize unnecessary overhearing. Flooding is the most frequently used method for nodes to exchange network information or deliver Routing Request (RREQ) messages to a destination [3]. Moreover, the simplest way to flood a network is through a technique called Simple Flooding or Pure Flooding [4]. It is believed that with variable transmission ranges in Ad-hoc networks can perform more complex tasks.

The proposed scheme dynamically adjusts the RREQ prospect of forwarding at each node, based on the node position (Gateway/Non-gateway). On the other hand, this base is unobserved in sparse region as compared to dense region to maintaining the network connectivity. The new scheme not only reduces unnecessary retransmission but also increases reachability of data packet and at the same reducing dropped packet ratio and packet loss. Thus, reduces overall routing overhead and improves the energy consumption and throughput

II.LITERATURE REVIEW

As the type broadcast scheme used plays an important role in the performance of the network, it has to be selected

carefully. In MANETs there are several broadcasting protocols designed to achieve an efficient flooding to avoid unnecessary retransmission. Williams and Camp [11] classified the existing efficient flooding schemes into simple flooding, probability based schemes, counter-based schemes, distance based, location-based schemes and neighbour knowledge schemes. Ying et al [12] introduced this work attempt to reduce flooding traffic by exchanging location knowledge between neighbouring nodes. So that retransmission is limited to nodes near the boundary of each other. In this scheme, the transmission area of the node N is divided into six equal-size regions and labelled as NP 1,NP 2, NP 3, NP 4, NP 5 and NP 6 respectively. However, most of these schemes assume that every node in the network has the same transmission range. Therefore, these schemes have poor performance when the nodes in the network have different transmission ranges, [9]. Nevertheless, asymmetric/unequal radio range in wireless communication can occur in MANETs for many reasons such as power saving protocols [10]. Cluster-based flooding scheme have suggested by many researchers as a way to improve broadcasting reliability. In the previous works [14], [15], algorithm divides an entire network into groups, each of which being represented by a Cluster Head (CH).

The CH dominates all other members in the group and retransmits broadcast packets. However, they require the large amount of information exchange and reconstruction of the clusters whenever the network topology changes. It has been found, in the entire wireless network and MANET in particular that, transmission collision is a major source of energy loss. As a result, the researcher chooses the applied forwarding scheme, motivated by the following reasons:

First, it is easily implemented, because it only needs a few lines of code to design it. Second, no additional hardware or calculation is needed to operate it. Finally, the node need not wait for a random delay period; node can immediately decide to forward or rebroadcast the RREQ or not.

III. PROPOSED ALGORITHM

In our proposed system, nodes do not need a positioning system or distance calculation to determine their location. The proposed protocol divides the network into different groups based on their transmission-power levels. Therefore, the node which receives HELLO message from different groups is considered a Gateway node. This node efficiently participates in forwarding RREQ packets and the unnecessary redundant retransmission is avoided. And also less time consuming to forwarding the packet . To schedule those gateway nodes for time saving and efficiently forward RREQ packets by AODV-UU routing protocol. To improve the efficiency and reduce the energy rate by using proposed protocol. AODV-UCSB uses the Net filter kernel modules from the AODV-UUv0.4 release. In addition to the base AODV specification, a number of Hello message options are available. These include requiring reception of multiple Hello messages before neighbor connectivity is established. This avoids creating routes to neighbors based on a single spurious message reception.

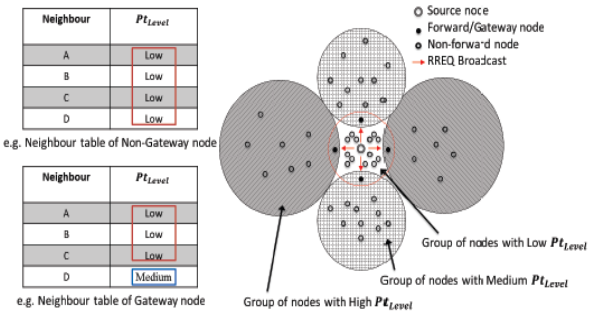

Figure 2. The proposed Gateway Forwarding

An AODV-UU energy-efficient adaptive forwarding scheme have the variable Transmission-Power levels of the neighbouring nodes. It adjusts the RREQ probability of forwarding at each node, based on the node position (Gateway/Non gateway).Not only reduces unnecessary redundant retransmission. But also increases reachability of data packet and at the same reducing dropped packet ratio and packet loss. The node need not wait for a random delay period, a node can immediately decide to forward or rebroadcast the RREQ or not. Only specific nodes can participate in re-transmitting RREQ packets.

The basic idea is that only those nodes have to forward the packet, which bridge groups of nodes with different Pt_{Level}. Intuitively, the node that has the same Pt_{Level} as its neighbours is most likely located within the same group. Thus, all neighbours may receive a broadcast packet.

Pt_{Level}	Pt_{Value}	Pt_{Range}
high	0.28183815	250 m
medium	0.24169726	200 m
low	0.20191908	170 m

Table 1 Transmission-Power Levels

On the other hand, this base of gateway determination is ignored for the node that is located in a high-sparse or high-dense network region (all its neighbours have same Pt_{Level} and there is no node determined as gateway), to maintaining the network connectivity. Therefore, the Pt_{Level} is utilized in the proposed method in order to attain more efficient and reliable flooding. When the nodes knowledge is used to determine if it should participate in RREQ forwarding, two goals are achieved. First of all, energy that is the main resource of nodes will be reserved, because only specific nodes can participate in re-transmitting RREQ packets. Secondly, the impact of increasing control overheads and congestion in wireless network, which could lead to degrading of the networks performance, are avoided. AODV-UU implements the AODV protocol, and it is compliant with IETF RFC 3561.AODV-UU was developed by the Uppsala University, Sweden and released under the GNU general public license (GPL). The suffix UU is added for the word Uppsala University. AODV-UU was initially written in C for running with Linux. It is popular among the academician and researchers. Uppsala University's AODV implementation has been imported to the INET framework. This is integrated with INETMANET too. The mobile ad hoc network (MANET) supports the multi-hop communication by using IP routing.

V. PERFORMANCE RESULTS

To analyze the performance of our scheme, we com-pare our Proposed Algorithm with Pure-Flooding (PF-AODV)which use blind flooding to disseminate RREQ packets, and Dynamic-Power (DP-AODV) which use Transmission-Power control mechanism to reduce the signal collision..Our simulation results are obtained from 5 different movement scenarios and 5 different traffic scenarios which means that each metric value is the mean of the 25 runs. Generally, 95%of the confidence interval was small compared with the value that was being reported.

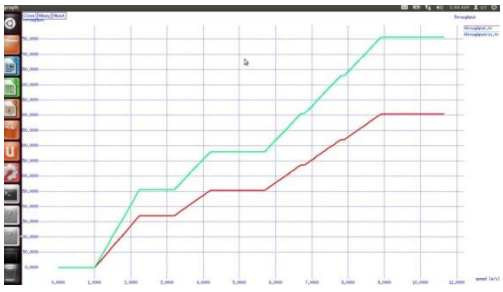

Figure 3.Throughput

Fig 3 shows the performance of the protocols based on data throughput. The Proposed Algorithm shows superior performance compared to the other two protocols. This is because in the Proposed Algorithm there are restrictions on RREQ rebroadcasting. This reduces the amount of unnecessary signaling for route discovery. Thus, reducing the overhead that can cause collision. Fig. 4 shows the packet delivery ratio (PDR). The PDR is the most important performance metric for flooding mechanism, considering that the goal of broadcasting is to deliver packets to all nodes. Our Proposed Algorithm has a significant impact in improving PDR it comes as a result of that our technique mitigates more network On the other hand, while increasing the nodes number in the network, the PDR of PF-AODV and DP-AODV are noticeably decreased, this is because pure broadcast induces unnecessary redundant retransmission of RREQ packet, collisions in the network, and causes the broadcast storm problem,collision and contention.

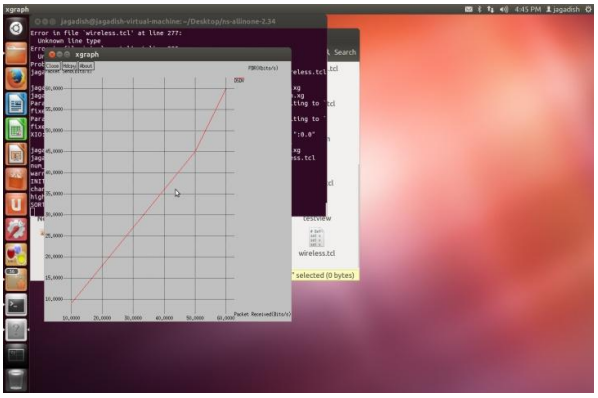

Figure 4. Packet Delivery Ratio

V. CONCLUSION

While energy consumption can be reduced at device level, at transmission level or by using power aware routing protocol .This project presented a novel hybrid scheme that combines diverse techniques that work together to reduce overhead and preserve energy. The techniques used are: 1) Using Transmission-Power control mechanism in order to reduce meddling between nodes and increase the throughput in the network, thus dipping the overall energy consumption. 2) Mounting Transmission-Power aware routing algorithm in order to confine rebroadcast RREQ packets to avoid unnecessary overhearing, and selecting the fitting power level to deliver the RREP packets to its destination; especially in asymmetric link situations. 3) Avoiding processes that majorly depend in their function on Global Positioning System (GPS) and distance calculators which waste the energy and computation resources at device level. As a result, working with different transmission ranges caused asymmetric link problem to occur. Therefore, this problem was addressed by modifying the proposed RREQ process to effort deliver the RREP packets to its

destination. Thus, most data packet drop cases in routing layer is avoided and reduce the time to forward the packets to its destination.

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