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Bandwidth and Mobility Based Stable Route Formation in Mobile AD HOC Networks

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Abstract*: Paper Usually, Mobile Ad hoc Networks (MANET) is a dynamic background thus complicated to supply a perfect resolution to convince the Quality of Service (QoS) needs for many applications. In this paper, we introduce a mechanism, namely Bandwidth and Mobility based Stable Route (BMSR) Formation for increasing network efficiency in MANET. In this mechanism, we choose the relay node by the node mobility, bandwidth and quality of link. This mechanism considerably increases the node reliability and stability in the network. Thus it diminishes the probability of link breaks and the overhead. The simulation analysis indicates that the proposed method provides guarantee QoS and network efficiency.

Keywords: Reliability, Stability, Routing, bandwidth, link quality, Mobile ad hoc network.

I. INTRODUCTION

This MANET is a division of infrastructure-less network that is built by a number of autonomous mobile nodes. Actually, the node movement and the insufficient resources openly affect the packets delivery that furthermore depends on choosing the route quality. The basic routing protocols mainly concentrate on reduce hop count of the routing path. These protocols are inefficient to provide better quality [11].

Many protocols offer successive routes based on node distance, energy, etc. Also, several protocols depend on resources' preservation in the network. However, these two categories of node mobility do not considered thus highly affect network performance. Therefore, the link stability is a vital parameter during select the route in the network [12].

In this paper, we propose Bandwidth and Mobility based Stable Route Formation in MANETs. Here, the stable link is selected based on the node mobility, bandwidth and link quality. The highest available bandwidth, highest link quality & less mobility nodes are selected as a relay node.

The rest of the paper is structured as follows: Section 2 describes the related work. In section 3, we proposed Bandwidth and Mobility based Stable Route Formation in Mobile Ad hoc Networks. Section 4 indicates an analysis of the simulation results. At the end, section 5 demonstrates the conclusions.

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II. RELATED WORK

A weighted multicast routing method main function is multicast packets are sent alongside with the Rudolf Steiner tree communications. In this scheme, the accepted interval period of a transmission link that is known as weight. Thus, it provides a more stable route against node mobility [1].Q-Learning algorithm is used to improve the bandwidth efficiency and link stability. This scheme diminishes the route errors in the network [2]. Link stability route selection provide high stability route and link connectivity. Link stability computes the link stability by distance among neighboring nodes, energy as well as the link value [3]. The node received signal strength (RSS) is also utilized for measuring the relation stability [4]. QoS based link stability calculation provides better link stability in MANET. This parameter based select the path provide better link stability and diminishes the network delay [5]. Optimized Link State Routing is intended Semi-Markov Smooth as well as complication limited quality model that follows adequately with reasonable node behaviors and is classically utilized for node reliability [6].Link reliability approach depends on energy, communication cost. In this scheme, the cluster head forms the topology by a count of hops and link reliability [7]. Mobility on topology control is used to cooperate the trade-off among topology control and reliability [8]. In this scheme, the K-edge connected method that effort to elect a suitable value of k for every restricted chart by local movements. Also, it provides assurance with network connectivity . QoS Based sending as well as none sending vigorous Node election technique chooses the forward node based on reaching QoS in an earlier communication. In this scheme, the Connection Existence Period (CEP) refers to the present link period among two nodes. The highest CEP worth is elected as a transmitter. It provides the node reliability [9]. Robustness Enhancement using Opportunistic Routing, select the relay node by link quality and the distance to the receiver. Thus, the data can attain the receiver without jitter and packet losses [10].The Resource Aware and Link Quality (RALQ) routing strategy [13] formed the route by link quality and energy utilization for data transmission and receiving. It improves the routing efficiency. Link Quality Evaluation Routing [14] makes the route depending on the energy of the node as well as the quality of the link. Thus it offers consistent data packet delivery as well as better energy efficiency. A cross layer frame work is introduced to better data distribution and elastic traffic in multi hop wireless network [15]-[17].

III. MATERIALS AND METHODS

In this scheme, we form the reliable link by node bandwidth, node mobility and link quality parameters. The node bandwidth is used to measure the capacity of the channel.

The bandwidth computation is given below.

$$BW = C_C * (T_i / T_{in}) \quad (1)$$

Here, C_C represents the channel capacity and Ti, Tin denote the fraction of the inactive as well as active time to a fixed period.

In MANET, the node mobility is a significant factor because of the node mobility seriously affects the network performance. The motion of the nodule j regarding nodule iMOji is evaluated by the ratio of RSS among a successive packet communications starting a vicinity node. It calculates the formula is given below.

$$MO_B^{\ A} = 10\log\left(\frac{RSS^{new}_{A\to B}}{RSS^{old}_{A\to B}}\right) \quad (2)$$

If $RSS^{new}_{A\to B}$ <, then $MO_B^{\ A}$ < 0, as well as the negative value of the movement parameter among two nodes. Alternatively if $RSS^{new}_{A\to B} > RSS^{old}_{A\to B}$, then $MO_B^{\ A}$ is positive and it specifies that the nodes are going nearer to each other.

Link Quality (LQ):This parameter evaluates the count of retransmission necessary to forward packets by determining the loss rate. Every node LQ worth is modified by the effect of intrusion, noise and signal communication range. LQ represents the fraction of the bits error count to the count of received bits. It computes the equation is given below.

$$LQ = \frac{Count\ of\ Bits_{error}}{Count\ of\ Bits_{received}} \quad (3)$$

During route invention, the sender node forwarding route request (R_Req) message to its neighbour node. This message contains node Sender ID, sender location, Time to Live, bandwidth, node mobility link quality, Receiver ID and Receiver location. Then received R_Req message nodes send the route respond message to the sender. Then the source node checks the node mobility. If suppose the node bandwidth, link quality is greater value and the node mobility is lesser that is chosen as a forwarder in the network.

IV. RESULT AND DISCUSSIONS

The simulation of BMSR has 30 nodes deployed in the simulation area 600x600m. Constant Bit Rate is used for handling the traffic model. The Omni-directional transmitter is utilized to obtain the signals from entire ways. The simulation result of BMSR is examined by utilizing factors like Packet Delivery Rate (PDR), Packet Loss Rate (PLR), and Residual Energy (RE).

A. PDR:

PDR is determined as the amount of data packets received at receiver per unit time. PDR is evaluated by formula 4.

$$PDR = \frac{\sum_0^n \text{Packets Delivered}}{T} \quad (4)$$

Where n represents the sensor node count as well as T represents the Time.

The PDR of BMSR and RALQ are plotted in Figure 1. It illustrates that the proposed scheme BMSR has 25.31% better PDR when compared to the existing RALQ.

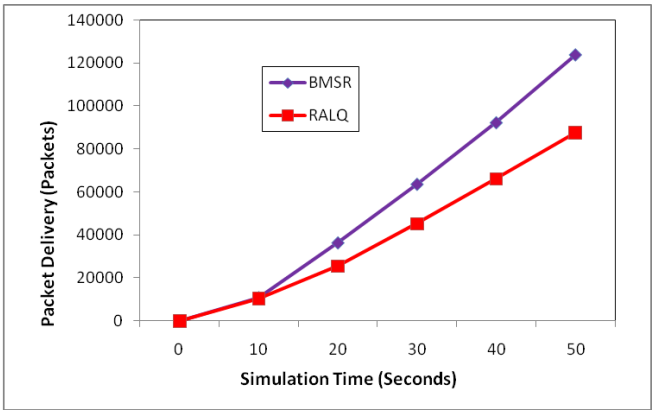

Fig. 1.PDR of BMSR and RALQ

B. PLR:

PLR is determined as the difference among the transmitted packets count as well as obtained packets count during data communication at the unit time. PLR is measured by Equation 6.

$$PLR = \frac{\sum_0^n \text{Sent Packets - Received Packets}}{T} \quad (5)$$

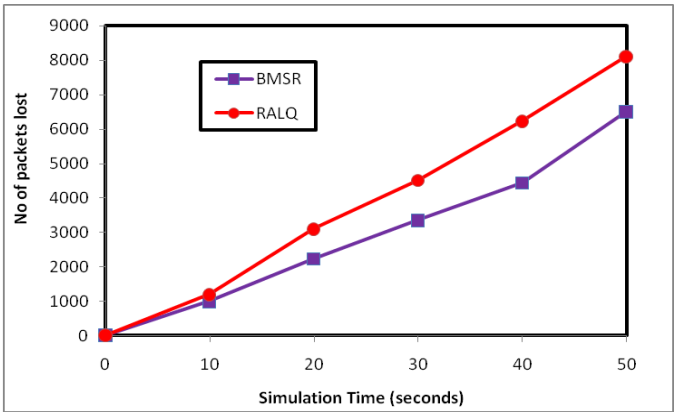

Fig. 2.PLR of BMSR and RALQ

Figure 2 shows the PLR values obtained from the simulation analysis of BMSRand RALQ. It indicates that the PLR of RALQ is higher by 55% when compared with BMSR.

C. RE:

Amount of energy residual in a sensor node at the present time period is known as RE. Figure 3 indicates the RE of BMSR is better when compared with RALQ. Around 6% of energy is saved per node by using the BMSR strategy for routing

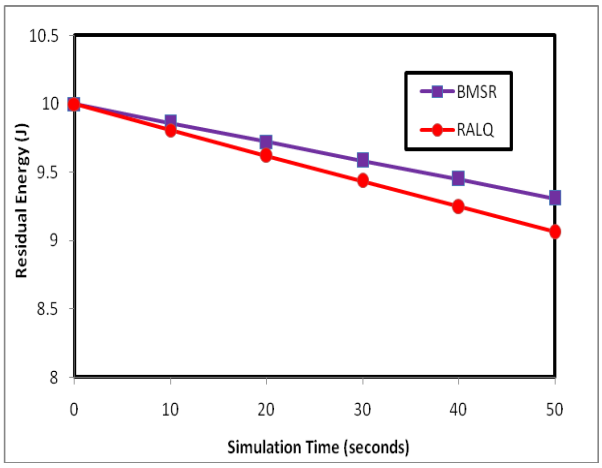

Fig. 3.RE of BMSR and RALQ

V. CONCLUSION

In this work, we have described a protocol that permits keeping a stable and sustainable Network topology. Here, selects the transmit node by the node mobility, bandwidth and quality of the link. This scheme can improve the flexibility and scalability in MANETs. The results have established the effectiveness of our projected protocol in terms of the packet loss ratio and the end to end delay.

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