ORIGINAL ARTICLE

Robust against route failure using power proficient reliable routing in MANET

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Abstract   The aim of this paper was to propose a novel routing protocol for Mobile Adhoc Network communication which reduces the route failure during transmission. The proposed routing protocol uses 3 salient parameters to discover the path which ensure the reliable communication. The quality of the channel, link quality and energy level of the node are the major reasons for unintentional node failure in mobile Adhoc network. So the proposed routing protocol considers these three parameters to select the best forwarder node in the path. The reliable data communication is achieved by transmitting data via path selected by the proposed routing scheme has been proven using network simulator (NS2).

1. Introduction

Mobile Adhoc Network consists of light weight mobile devices and they communicate with each other using various wireless communication technology. The evolution in wireless communication makes the MANET suitable for various applications. MANET gains much attention by a range of applications because of its special features listed below.

- MANET enables communication among mobile nodes without static access point or base station.
- Each node in MANET configures itself as routers.
- Self–healing via incessant re-configuration.

- The topology of the network changes dynamically without the need of central administration.
- MANET is easy to design and install.

In Military battlefield [14], MANET is used to exchange the information between soldiers and vehicles. MANET is most widely used for conference applications because it can form the instant link between mobile devices such as notebook and palmtop computers. The infrastructure less property of MANET can be easily useful for emergency application such as disaster relief.

Sometimes these special features of MANET make a challenge in Adhoc Networks. The dynamic nature (Change in topology) of MANET reduces the Quality of Services (QoS) provided [12]. But providing QoS is necessary as MANET is most widely used for critical and sensitive applications. The Metrics of QoS are end to end delay, Data transmission rate, Jitter and message delivery guaranty. The QoS provided by MANET is mainly affected by interference between the mobile nodes [2,4]. The interference occurs in MANET due to the

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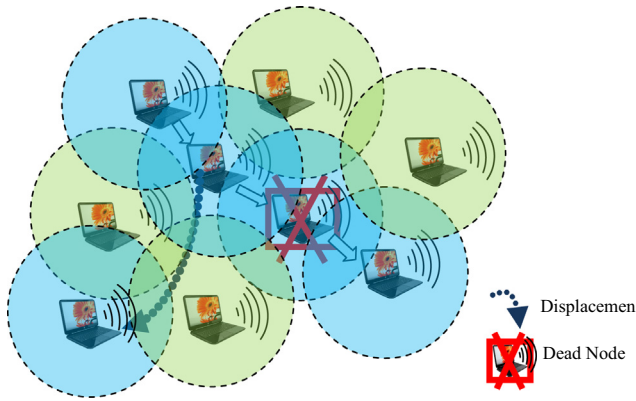
Figure 1 Route failure demonstration in Mobile Adhoc Network.

node that moves away from the communication range as shown in Fig. 1. For example, when two mobile nodes are in communication, any one of the node or both nodes move away from each other's communication range may lead to packet-drop.

In this paper, we propose a novel routing scheme named as power proficient reliable routing (P2R2) protocol. The proposed routing scheme, checks the capacity of the channel exists between source and destination. If the capacity is higher than certain threshold, it will allow the source and destination to communicate directly. Otherwise, it will discover the multi-hop path. The relay nodes in the multi-hop path are selected based on three parameters such as channel capacity, link quality and residual energy of the nodes and the consideration of these three parameters during route discovery process will reduce the route failure during transmission In MANET.

The rest of this paper is organized as follows. In Section 2, the Existing works related to the proposed scheme are presented. In Section 3, we show the problem formulation and propose the Power Proficient Reliable Routing to solve the problem. Finally, simulation results are given in Section 4 and a conclusion is drawn in Section 5.

2. Literature review

Designing a routing protocol for MANET is a challenging task as MANET is an infrastructure less dynamic network. Several routing protocols are available for MANET. The routing protocols for MANET are classified into two: Proactive and Reactive routing protocols. The proactive routing protocols are conventional shortest path protocols. The routing table is maintained by each node in the network. So, the proactive routing protocols are called as table-driven routing protocols. The proactive routing protocols lead to high routing overhead by continuously updating the routing table as per the changes in the topology. Reactive routing protocols discover the routes only when needed or on-demand. The source node initiates the route discovery process in case of reactive routing protocols. The proactive routing protocols are not best suitable for highly dynamic large scale MANET [10,11]. In this section, we are going to see some of the recent routing protocols designed by different authors.

Wang et al. [5], have made opportunistic data forwarding possible in MANET by proposing a light-weight Proactive Source Routing Protocol (PSR). The Breadth First Search spanning tree is maintained by each node in case of PSR. Each node periodically exchanges the information needed to construct the spanning tree between neighbor nodes. Therefore each node has the path to reach all other nodes in the network. PSR allows source routing which reduces the routing overhead. But PSR does not consider the QoS parameter to construct the path. This may lead to frequent route failure in the highly dynamic MANET.

Preetha et al. [1], analyzed that recurrent link failure is the significant feature of degrading the performance of the network. They studied the route failure of AODV protocol and recommended a solution to recover it. A novel approach is proposed to minimize the route failure in MANET by accumulating the alternate path in the forwarder nodes. In the proposed approach, intermediate nodes in the path also engage in the route discovery process. Because of this, overhead to establish the route is reduced. Only link failure is considered for route failure in this study [6]. The other parameters causes' route failure is not considered during route discovery process.
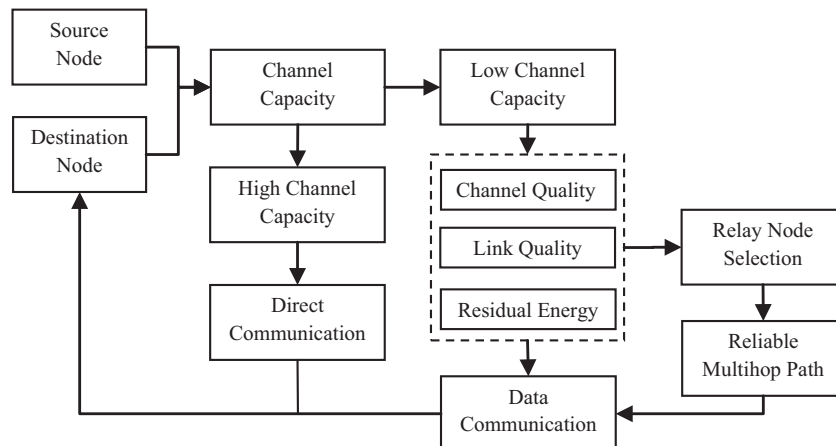

Figure 2 Block diagram of the proposed scheme.