Improving Data Accessibility in Mobile Ad Hoc Networks

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In mobile ad hoc networks, the networks topology changes dynamically and partition among mobile nodes occur frequently. These are due to unpredictable mobility of mobile nodes and each mobile nodes act as routers which discover and maintain routes, and forward packets to other nodes. We address the problem of replication in mobile ad hoc networks by exploring group mobility approach. Group mobility refer to the scenario where several mobile nodes are tends to move together. Group mobility approach is used to increase the data accessibility among mobile nodes through data replication and consistency group management. It also guarantees basic level of system performance, such as throughput, delay and reduces the networks traffic among mobile nodes.

Keywords: Ad Hoc Networks, Mobility, Networks Traffic, Replication.

1. INTRODUCTION

The growth in wireless communication technologies attracts a considerable amount of attention in mobile ad-hoc networks (MANETs). A MANET is a self-organizing, rapidly deployable network which consists of wireless nodes without infrastructure. All nodes in a MANET are capable of moving actively and can be connected dynamically. Due to the lack of infrastructure, mobile nodes of a MANET also function as routers which discover and maintain routes, and forward packets to other nodes. Since mobile hosts move freely, disconnections occur frequently, and this causes frequent network partition. If a network is partitioned into two networks due to the migrations of mobile hosts, mobile hosts in one of the partitions cannot access data items held by mobile hosts in the other. Thus, data accessibility in ad hoc networks is lower than that in conventional fixed networks. In ad hoc networks, it is very important to prevent the deterioration of data accessibility at the point of network partition. A possible and promising solution is the replication of data items at mobile hosts which are not the owners of the original data. This means that the route overhead of such an algorithm increase with the square of the number of mobile nodes in a MANET.

In a reactive routing scheme, the disturbing RREQ (Routing Request) flooding over the whole networks and the considerable route setup delay become intolerable in the presence of both number of nodes and mobility.

The mobility prediction schemes that attempt to predict the future availability of wireless links based on individual node mobility model, in order to improve routing algorithm efficiency and build more stable routes. The main cause of network partitioning is the group mobility behavior of the mobile nodes belonging to the same movement group exhibit similar movement characteristic, while the node of different groups shows diverse mobility pattern [1]. Because of node mobility, the topologies of networks are disconnected into several disconnected partitions and hence decrease the accessibility of data item. Consider the scenario in Figure 1. Where there are six mobile nodes (m1, m2, m3, m4, m5, m6) and share their information between m1 and m4 respectively. Assume that the link between m1 and m4 disconnected due to different mobility pattern of nodes in Figure 1. It is not only for infras-
information $S$ has about $D$, and $V_{max}$ is the maximum speed that a node may travel in the ad hoc networks. The expected region $\varphi$ lies between $S$ and $D$.

5. CONCLUSIONS

In this paper we explore the problem of Data Accessibility in a MANET with group mobility. We first analyzed the group mobility model and derived several theoretical results. We proposed a Reference Point Group Mobility Model to handle group mobility. An entity mobility model needs to specify both the movement of the individual MNs within the group. We also proposed a multi-hop mobility model in the group mobility model in order to improve the bandwidth for data accessibility in service replication between the group communications.

REFERENCES