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Adaptive Neighbor Discovery Algorithms for Enhance the Neighbor Discovery in Wireless Network with MRP

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Abstract— ***Neighbor discovery is one of the first steps in configuring and managing a wireless network. Most of the existing work, however assume a single-packet reception(SPR) single packet can be received successfully at a receiver. In this paper, motivated by the increasing prevalence of multi packet reception (MPR) technologies in wireless networks .for instance CDMA (code division multiple access) and MIMO (multiple input and multiple-output), two widely used technologies, both support multi packet reception. Starting with a clique of n nodes, we propose a simple Aloha-like model, where only a algorithm, which takes (Θ= n l n n/ k) time to discover all neighbors with high probability in a network that allows up to k simultaneous transmissions. In addition, when Δ is large, we show that the adaptive algorithms are order-optimal, i.e., have a running time of O (Δk)which matches the lower bound for the problem.***

Keywords: Wireless Networks, Ad Hoc Networks, Multi packet Reception, Network Management, Neighbor Discovery, Randomized Algorithm.

I. INTRODUCTION

A wireless network is any type of computer network that uses wireless data connections for connecting network nodes. Wireless networking is a method by which homes, telecommunications networks and enterprise (business) installations avoid the costly process of introducing cables into a building, or as a connection between various equipment locations. Wireless telecommunications networks are generally implemented and administered using radio communication.

The Neighbor discovery is one of the first steps in configuring and managing a wireless network. The information obtained from neighbor discovery, viz. the set of nodes that a wireless node can directly communicate with, is needed to support basic functionalities such as medium access and routing. Furthermore, this information is needed by topology control and clustering algorithms to improve network performance. Due to its critical importance, neighbor discovery has received significant attention, and a number of studies have been devoted to this topic Most studies, however, assume a single packet reception (SPR) model, This is motivated by the increasing prevalence of MPR technologies in wireless networks.

First we analysis the Aloha-like neighbor discovery algorithm, and show that the neighbor discovery time is $\Theta(\ln n)$ in an idealized MPR network that allows an arbitrary number of nodes to transmit simultaneously, and the neighbor discovery time is Θ (n ln n k) when allowing up to k nodes to transmit simultaneously.

In this paper to propose two adaptive neighbor discovery algorithms, one being collision-detection based, and the other being ID based. In both algorithms, a node becomes inactive once it is discovered by its neighbors, allowing the remaining active nodes to increase their transmission probability.

II. EXISTING SYSTEM

In our Existing Method propose the use a multiuser-detection based approach for neighbor discovery. They require each node to possess a signature as well as know the signatures of all the other nodes in the network. we address two problem associated with static ad hoc wireless network method of saving energy during a deployment of the nodes and efficient methods of performing adjacent neighbor discovery.

A large number of works have focused on the problem of accelerating the process of ND in wireless networks and various protocols have been proposed to adapt to different situations. Compared with existing deterministic and multi-user detection-based protocols, randomized protocols are most commonly used to conduct ND process in wireless networks. In those protocols, each node transmits at different randomly chosen time instants to reduce the possibility of the collision with other nodes.

Further, nodes are assumed to operate in a synchronous manner. When a node receives transmission from multiple neighbors, it determines which nodes are the transmitters based on the received signal (or energy) and the prior knowledge of the node signatures in the network. In this method allow multiple transmitters to transmit simultaneously, their focus is on using coherent/non-coherent detection to identify the neighboring node.

III. PROPOSED SYSTEM

In our proposed system propose the Aloha-like algorithm to discover all neighbor node .We first consider a clique of n nodes in which node transmissions are synchronous and the number of nodes, n, is known.

In this Aloha-like neighbor discovery algorithm, show that the neighbor discovery time is Θ(ln/n) in an idealized MPR network that allows an arbitrary number of nodes to transmit simultaneously, and the neighbor discovery time is Θ (n ln n /k) when allowing up to k nodes to transmit simultaneously. We next design two adaptive neighbor discovery schemes that improve upon the Aloha-like scheme.Both schemes utilize feedback information from nodes to achieve faster discovery. One of the schemes requires collision detection at nodes, i.e., the ability to distinguish between a collision and an idle slot, while the other scheme only requires each node to transmit the IDs of the discovered neighbors as feedback to other nodes.

A. Aloha-Like Neighbor Discovery Algorithm

In this section, we consider the ALOHA-like neighbor discovery algorithm first proposed in [13], which assumes that nodes do not have a collision detection mechanism. We start out making several simplifying assumptions:

1. We consider a single clique of size n.
2. In is known to all nodes in the clique.
3. Time is divided into slots and nodes are synchronized on slot boundaries.

We first show how the ALOHA-like algorithm can be extended to operate when n is unknown to the nodes. The execution of the algorithm proceeds in phases, each phase consisting of one or more time slots. The algorithm operation is very simple. In phase i, each node transmits with probability 1/2i, where each phase i lasts a duration of 2ie(ln 2i+c) slots, where c is a positive constant.

B. Adaptive Neighbor Discovery

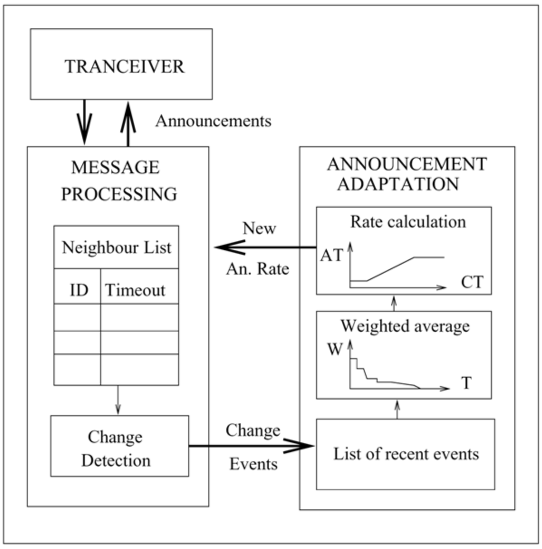

Fig1: Adaptive neighbor Discovery algorithm

The motivation for an adaptive neighbor discovery algorithm is to get maximal service availability with minimum bandwidth consumption for a given error rate in different wireless network environments. Nodes may move with totally random speed and movement patterns.

C. Collision Detection-Based Algorithm.

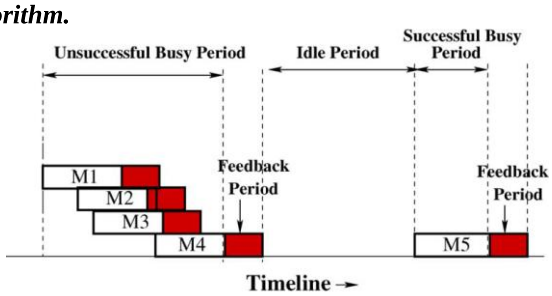

Fig 2:Asynchronous collision detection-based algorithm.

Collision Detection based Neighbor Discovery, a node uses the collision based neighbor discovery algorithm to know whether its transmission is successful or not. Now we assume the node can distinguish between a collision and an idle slot. We divide a slot into two sub slots. In first slot the odes either transmit or listen the packets. If a node listens in the first sub-slot and can decode the received packets successfully, then it deterministically sends a signal in the second sub-slot; otherwise, it remains silent. A node that transmits in the first sub-slot knows its transmission is successful if and only if it hears a signal (or senses energy) in the second sub-slot.

D. Id Based Neighbor Discovery

ID-based scheme, we require each node to record the IDs of the nodes that it hears in each slot. When a node transmits, it transmits its ID as well as the IDs of every node from which it successfully received a message in any of the past slots. The key challenge in the ID-based feedback scheme is in devising an efficient scheme to encode node IDs in the messages transmitted by nodes to ensure that the message lengths remain bounded. A naive implementation of the ID-based feedback scheme in which each node uses the binary representation of the IDs, can lead to very long message lengths.

IV. REQUIREMENTS

Hardware used:

Processor: Pentium i4 Processor with frequency 2.4 GHz
RAM : 40GB and above

Software used:

Operating System : Windows XP Professional
Tool : Visual Studio 2010

V. RESULTS

We calculate the performance of the proposed method in the following applications: to improve the higher energy efficiency, improve throughput, and reduce network delay.

CASE 1: Network Creation

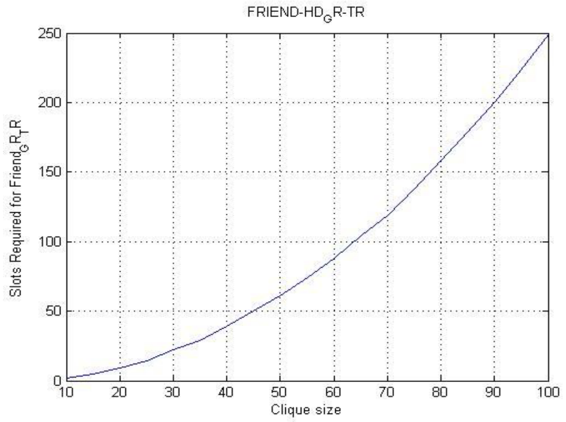

Fig 3: Neighbor Discovery(FRIEND-TR)

FRIEND-GR:

At the beginning of a sub-slot, each node should determine its action in the following normal slot. Note that each node should run a copy of FRIENDGR

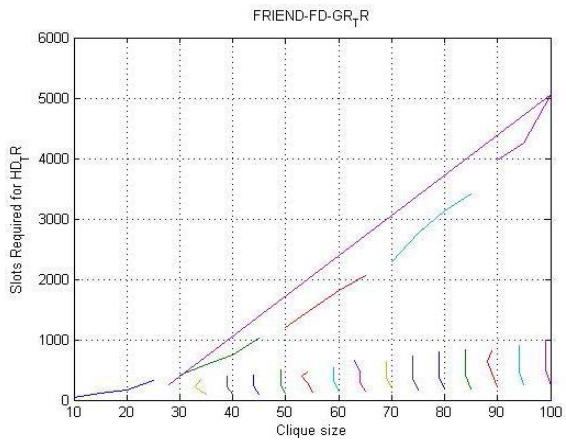

Fig 4: Deployment of the slots required for the FRIENDGR TR and Clique size.

we address two problem associated with static ad hoc wireless network method of saving energy during a deployment of the nodes and efficient methods of performing adjacent Neighbor discovery We propose a novel randomized protocol FRIEND, a pre-handshaking neighbor discovery protocol, to initialize synchronous full duplex wireless ad hoc networks.

CASE 2: Expected Result

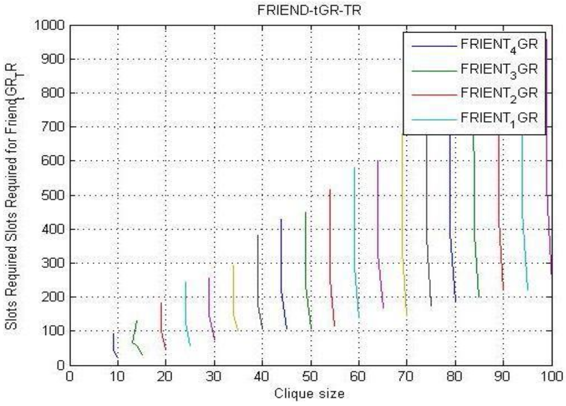

Fig5: Neighbor Discovery(FRIEND-tGR)

FRIEND-TR:

In FRIEND-TR, there are two scenarios:

If A sends Md, A will meanwhile check the existence of other signals

Input: Gets the input as the number of nodes, node id and the Transmission Range.

Output: Number of neighboring nodes with respect to the node Id.

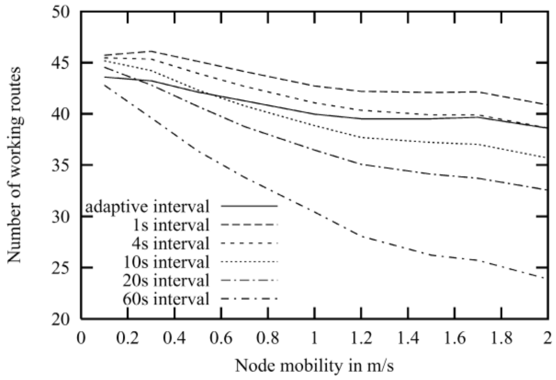

Fig6: Evaluation of working routes

The simulation shows that at low mobility all algorithm will perform well and offer a mean of 45 working routes. The mean value does not reach the maximum of 49
possible routes due to network partitions. The adaptive algorithm shows almost constant detection accuracy and has almost constant performance in finding routes.

CASE3:Simulation Results

History Table Size	N	3
Min. announcements	AR_{min}	1 sec
Max. announcements	AR_{max}	60 sec
Announcement factor	AF	1
History Weights	W_1, W_2, W_3	75,15,10

Table 1: Parameter for adaptation

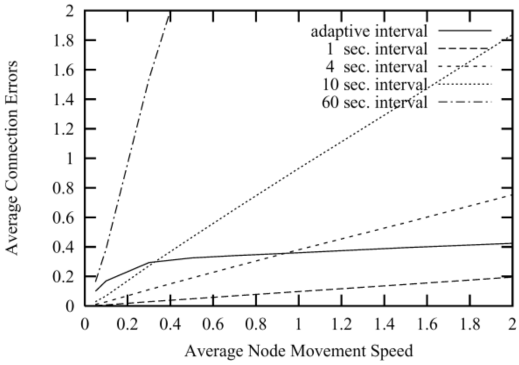

Fig7: Evaluation of algorithm behavior

Each simulation run analyzes one hour of networking time with nodes at a given speed. We compared our adaptive algorithm against an algorithm with constant announcement intervals using four fixed announcement periods ranging from 1 to 60 seconds.

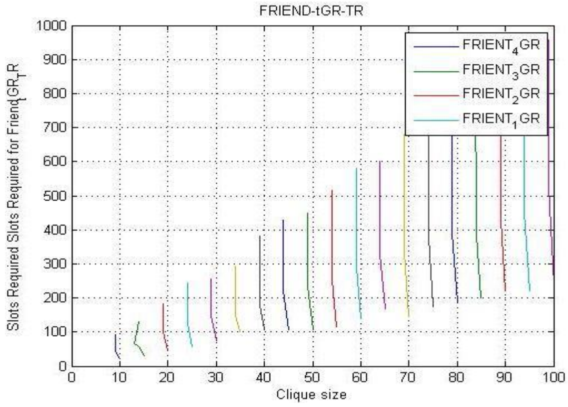

Fig8: Neighbor Discovery(FRIEND-TGR-TR)

VI. CONCLUTION

In this paper, we designed and analyzed randomized algorithms for neighbor discovery for both clique and general network topologies under various MPR models. It can be extend the Aloha-like algorithm schemes to accommodate a number of practical scenarios such as when the number of neighbors is not known beforehand and the nodes are allowed to transmit asynchronously which is named by two adaptive algorithm. Finally We show that the adaptive algorithms yield a $\Theta(\ln n)$ improvement over the Aloha-like scheme for a clique with n nodes and are thus order-optimal.

In our future work investigate the neighbor discovery in multi-hop MPR networks. In most of the existing protocol have no multiple packet reception is used that is, a collision occurs when two or more nodes simultaneously transmit packets to it in a slot. So in our future work we are developed the FRIEND protocol conducts the neighbor discovery process and it significantly reduces the probability of generating idle slot and collisions.

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