Time Efficient & Collisions Detection using Neighbor Discovery Friend Protocol for Wireless Network

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Abstract- *In randomly deployed networks, such as Wireless Networks with Multipacket Reception, an important problem for each node is to discover its neighbor nodes so that the connectivity amongst nodes can be established. Neighbor Discovery (ND) is a basic and crucial step for initializing wireless networks. A fast, precise, and energy-efficient ND protocol has significant importance to subsequent operations in wireless networks. However, many existing protocols have high probabilities to generate idle slots in their neighbor discovering processes, which extend the executing duration, and thus compromise their performance. To propose a simple Aloha-like algorithm, ID-based Neighbor Discovery algorithm, and to significantly reduce the probabilities of generating idle slots and collisions. With the help of adaptive neighbor discovery algorithms that dynamically reduce the transmission probability for each node. Theoretical analysis and simulation results show that Aloha-like algorithm can adapt to various scenarios, and significantly decrease the duration of ND.*

Keywords- Wireless Networks, Ad Hoc Networks, Multi packet Reception, Network Management, Aloha-like computation

I. INTRODUCTION

Self-Organization and Multi-Hop communication are two major characteristics of a typical Wireless Ad-Hoc network. To achieve Self-Organizing and Multi-Hop communication, it is imperative for a given node to discover its neighbors. In the most of the applications of wireless ad hoc networks, the communication pattern is multi-hop. Multi-hop communication is preferred by the routing protocols because of energy efficiency. However, for achieving multi-hop communications a node is supposed to first identify those nodes around the given node which are exactly one hop away, such nodes are termed to be as neighbors of the given node and the process initiated by the given node to identify such one hop distant surrounding nodes is called as Neighbor Discovery (ND).Knowledge of neighbors is an essential to start proper operations for the MAC protocols and routing protocols. However, it is expected that the ND process should not only be accurate and precise but also resource efficient and quick. Discussed about the Neighbor discovery algorithms. They can be classified into two categories, viz. randomized or deterministic. In a randomized strategy neighbor discovery, starts with randomly chosen times and discovers all its neighbors by a given time. In a deterministic neighbor discovery algorithm, each node transmits according to a pre-determined transmission schedule that allows it to discover all its neighbors by a given time with probability one. Guaranteed neighbor discovery typically comes at the cost of increased running time and often requires unrealistic assumptions such as synchronization between nodes and a priori knowledge of the number of neighbors. Therefore, choose to investigate randomized neighbor discovery algorithms. The performance can be analyzed in terms of time taken for ND, energy consumed by ND process, system resources spent, accuracy or reliability of result. The characteristics of a typical ND process are:

- Nodes have either a prior knowledge of neighbors or not.
- Nodes are either collision aware or not.
- ND process is done either in a synchronous or in an asynchronous manner.
- Nodes are either aware about initialization and termination criteria or not.

II. RELATED WORK

C. L. Arachchige, et al., 2008 [1] an asynchronous distributed algorithm for solving the neighbor discovery problem in completely connected CR networks. The algorithm is based on electing a head for the network and then the head performing neighbor detection operations. Also the algorithm provides a method of informing discovered nodes about their neighbors and neighbor’s obtainable channel sets.

R. Cohen, et al., 2011 [2] a new difficulty in wireless sensor networks, referred to as constant continuous neighbor discovery. That continuous neighbor discovery is critical still if the sensor nodes are stationary. If the nodes in a linked segment work together on this task, hidden nodes are assured to be detected within a certain probability P and a certain time period T, with compact expended on the discovery

G. Jakllari, et al., et al., 2007[3] a MAC protocol for employ with directional antennas in mobile ad hoc networks. Our protocol satisfies the troubles due to asymmetry in range when these antennas are deployed. Also, it competently handles mobile scenarios by facilitating the detection of new neighbors by a node and the protection of links to the exposed neighbors. The key idea that forms the source for our protocol is to use a polling plan wherein a node polls its exposed neighbors occasionally; this would allow the node regulate its antenna weighting coefficients so as to constantly track its neighbors.

D. Angelosante, et al., 2007[5] the motivation for this protocol is the birthday inconsistency, in which it's calculate the probability that at least two people in a room have the similar birthday. The birthday protocol suggests that the detection of one node is satisfied when at least two nodes have the "same birthday" in the similar slot: one and only one of them is the sender, while the rest are all receivers. The detection period is sliced in slots. Each slot lasts extended sufficient Ts, to transmit one hello message.

III. DETERMINISTIC ALGORITHMS

Deterministic algorithms can be defined in conditions of a state machine: a state describes what a machine is doing at a particular instant in time. State machines are passed in a discrete way from one state to another.

Just after enter the input; the machine is in its initial condition or start state. If the machine is deterministic, means that from this point onwards, its current state determines what will be its next state, its course through the set of states is prearranged. Note that a machine can be deterministic and still never stop or finish, and therefore fail to deliver a result. In a deterministic neighbor discovery algorithms, each node transmits according to a prearranged broadcast schedule that allows it to discover all its neighbors by a given time with probability one. The downside of these algorithms is that typically they need increased running time and often the assumption that the number of neighbors must be recognized. For instance disco protocol.

Disco Protocol: An instance of a deterministic algorithm is Disco. The algorithm selects a pair of prime numbers such that the addition of their reciprocals is equal to the application's preferred radio duty cycle. Each node increments a local counter with a globally agreed-upon period and, if this local counter is divisible by either of the primes, the node turns on its means of communication for one counter period. This protocol ensures that two nodes will have some overlapping means of communication on-time within a bounded number of periods, even if nodes separately set their own duty cycle. Other deterministic protocols include the Power Saving protocols, or the Asynchronous Wakeup which are used in wireless sensor network.

IV. PROPOSED METHODOLOGY

Assuming a collision channel model of communication, Obtain the following important Proposed Methodology.

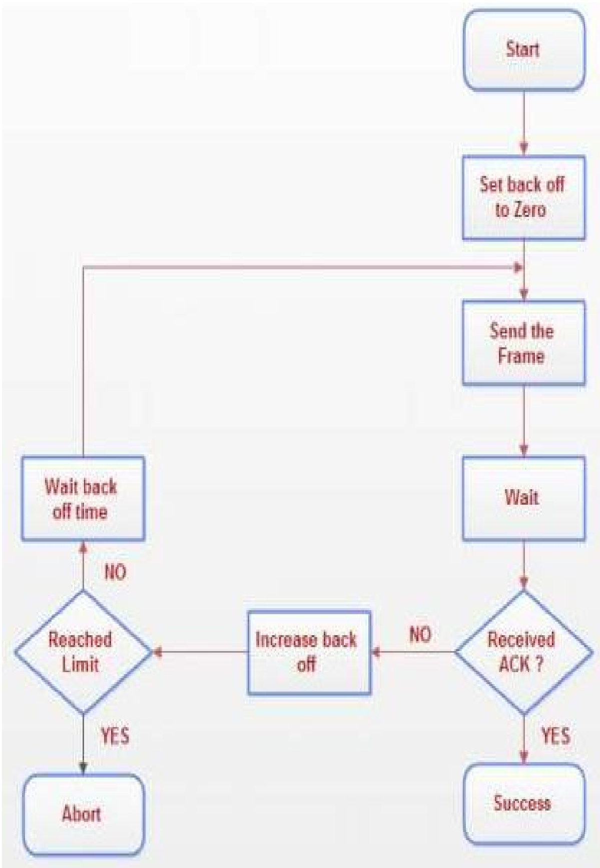

Fig 1: ALOHA-like neighbor discovery flow diagram

1) The ALOHA-like neighbor discovery algorithm proposed in a single-hop wireless network of n nodes. That its analysis reduces to that of the Coupon Collector's Problem and that each node discovers all its neighbors Q (n) in time t
2) When nodes can detect collisions, an order-optimal neighbor discovery algorithm that employs reaction from receiving nodes and allows each node to discover all its neighbors in Q(n) time t. interestingly, find that receiver reaction can be used even when nodes cannot detect collisions, and propose a novel algorithm that achieves a Q(n)running time.
3) That absence of an estimate of the number of neighbors, n, results in as low down of no more than a factor of two, compared to when nodes know n.

4) That lack of synchronization among nodes results in at most a factor of two slowdown in the algorithm performance from the case when nodes are synchronized.
5) Then describe how neighbor discovery can be accomplished even when nodes begin execution at different time instants. Furthermore, when nodes do not know n, propose a provably correct termination condition that allows each node to terminate neighbor discovery after discovering all its neighbors.
6) Finally, extend analysis to a general multi hop wireless network setting. Here, establish an upper bound of q (Δ ln n) for the running time of the ALOHA-like algorithm, where Δ is the maximum node degree in the network and denotes the total number of nodes.

Also establish a lower bound of Ω(Δ+ln n)on the running time for any randomized neighbor discovery algorithm. Our result thus implies that the ALOHA-like algorithm is at most a factor (Δ, ln n) worse than the optimal.

V. CONCLUSION

Obtainable efficient neighbor discovery algorithms for wireless networks that lengthily address various practical restrictions of the earlier approaches. Neighbor discovery algorithms do not need estimates of node density and allow asynchronous operation. Also, algorithms allow nodes to begin implementation at different times and also allow nodes to detect extinction. Investigation shows a gap between the lower and upper bounds on the running time for neighbor discovery in the network case. Clearly, the quest for an order-optimal neighbor discovery algorithm leftovers an intriguing prospect. Of particular interest is the question of whether the feedback-based algorithms, which are order-optimal in the single-hop case, can be extended to the multi hop network setting while outperforming the ALOHA-like algorithm. Another direction of interest is the extension of the various algorithms and the analysis presented in this paper to wireless channel models that incorporate phenomena such as fading and shadowing.

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