Bee-Inspired Routing Protocols for Mobile Ad HOC Network (MANET)

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Abstract – Mobile AdHoc networks( MANETs) are receiving a significant amount of attention from researchers. This paper provides a high light on a new and very energy efficient algorithm for routing in Manets BeeAdHoc. This algorithm is a reactive source routing algorithm and consumes less energy as compared to other existing state of art routing algorithms because a fewer control packets for routing are sent as compared to other networks.

I. INTRODUCTION

Mobile Ad HOC networks (MANET’S) are networks in which all nodes are mobile and communicate with each other via wireless connections. Nodes can join or leave the network at any time. There is no fixed infrastructure. All nodes are equal and there is no centralized control or overview. There no designated routers all nodes can serve as routers for each other and data packets are forwarded from node to node in multihop fashion.

Since a few years researcher’s interest in MANETS have been growing and especially the design of MANET routing protocols has received a lot of attention. One of the reasons is that routing in MANETS is particularly challenging task due to the fact that the topology of the network changes constantly and paths, which were initially efficient, can quickly become inefficient or even infeasible. Moreover control information flow paths, which were initially efficient, can quickly become inefficient or even infeasible. Moreover control information flow in the network is very restricted. This is because the bandwidth of the wireless medium is very limited and the medium is shared: nodes can only send or receive data if no other node is sending in their radio neighborhood. It is therefore important to design algorithm that are adaptive robust & self-healing. Nature self-organizing systems like insect societies show precisely these desirable properties. Making use of a number of relatively simple biological agents like ants, a variety of different organized behavior are generated at the system level from the local interaction among the agents and with the environment. The robustness and effectiveness of such collective behaviors with respect to variations of environment conditions are key aspects of their biological success. This kind of systems are often referred to with the term swarm intelligence. Swarm systems have recently become a source of inspiration for design of distributed & adaptive algorithms.

II. DESIGN ISSUES OF ROUTING ALGORITHMS

The most important challenge in designing algorithms for MANETs are mobility and limited battery capacity of nodes. Mobility of nodes results in continuously evolving new topologies and consequently the routing algorithms have to discover or update the routes in real time but with small control overhead . The limited battery capacity requires that the packets if possible be distributed on multiple paths , which would result in the depletion of batteries of different nodes at an equal rate and hence as a result the life time of networks would increase[1]. Therefore an important challenge in Manets is to design a routing algorithm that is not only energy effieicent but also delivers performance same or better than existing state of art routing protocols.

III. CLASSIFICATION OF ROUTING ALGORITHMS IN MANETS

The routing algorithms for Manets can be broadly classified as proactive algorithms or reactive algorithms. Proactive algorithms periodically launch control packets which collect the new network state and update the routing tables accordingly. On the other hand, reactive algorithms find routes on demand only. Reactive algorithms looks more promising from the prespective of energy consumption in Manets. Each category of above mentioned algorithms can further be classified into host intelligent or router intelligent algorithms . A few reactive algorithms are DSR ( Dynamic Source Routing ) which is host intelligent algorithm while AODV( AdHoc On Demand Distance Vector Routing) which is a router – intelligent algorithm.However these algorithms are not designed for energy efficient routing. Here in this study an deep insight is provided on BeeAdHoc which delivers performance same as better than that of DSR,AODV but consumes less energy as compared to them. The algorithm achieves these objectives by transmitting fewer control packets and by distributing data packets on multiple paths.

IV. EXISTING WORK ON NATURE – INSPIRED MANET ROUTING PROTOCOLS

The first algorithm which presents a detailed scheme for MANET routing based on ant colony principles is ARA [3]. The algorithm has its roots in ABC AND AntNet Routing algorithms for fixed networks and are inspired by the pheromone laying behavior of ant colonies . AntHocNet, which is hybrid algorithm having both reactive and proactive components have also been proposed.This algorithm tries to keep most of features of the original AntNet and shows promising results in simulation compared to AODV Termite is another MANET routing algorithm inspired by termite behaviour .Here no special agents are needed for updating the routing tables rather data packets are delegated this task.

V. OVERVIEW OF BEEADHOC ARCHITECTURE

BeeAdHoc is an on-demand multi path routing algorithm for mobile adhoc networks inspired from the foraging principles of honey bees[4]. BeeAdHoc works with types of agents: packers, scouts foragers and swarms. The packers locate a forager and hand over the data packet to the discovered forager. Scouts discover new routes from the launching node to the destination.