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ANALYZING MINIMAL DISTANCE AND CONTROLLING ENERGY CONSUMPTION USING GTEB ROUTING PROTOCOL

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ABSTACT-Wireless Sensor Networks provides an effective way to sense, analyze and transmit the data within the cooperative network. The lifetime of the WSNs are prolonged by using a decentralized routing protocol algorithm called Game Theoretic Energy Balance(GTEB) routing protocol, is achieved by extent the network lifetime by balancing energy consumption in a larger network area using Geographical routing protocols. In existing system they only extending the lifetime of wireless sensor network with energy balancing. In this paper we propose the method is capable of estimating the minimal distance between two non-neighboring sensors in multi-hop and also controlling the energy consumption of wireless sensor networks.

Index Terms-Wireless sensor networks, Game theory, multi-hop, energy consumption.

I.Indroduction

RECENT technological advances in sensor technology and wireless communication have enabled the deployment of large-scale wireless sensor networks for a variety of applications including remote habitat monitoring, battlefield monitoring, and environmental data collection (e.g., temperature, humidity, light, vibration, etc.). Since sensor nodes have limited resources, the cooperation may come at a significant expense.To find out the energy level and behavior of sensor node to save their resources in order to gain a longer lifetime and better service for themselves.this has to analyse for improve the performance. So, several techniques exist to address to analyse the energy level such as game theory based systems.

Game theory is one among the most appropriate techniques used to analyze and solve selfishness in wireless networks. In fact, it provides tools to develop analytic models of node behavior and predict the impact of different protocols and policies on that behavior. Moreover, it can help in designing systems that offer appropriate incentives for the participants to behave in constructive ways with respect to network objectives. The promise of game theory as a tool to analyze wireless networks isclear.

The main contributions of this paper are: (a) the prediction of sensor behavior based on the notion of utility function; (b) the characterization of the typology of selfish behavior of sensor; and (c) the use of game theory to optimize and consolidate the network coverage in WSNs mainly by detecting and solve selfish behavior.

The remainder of this paper is organized as follows. In Section 2, we describe the game theory in WSNs and we present the problem of selfishness in these networks. In section 3, we announce the CMP and we extract the moments of decisions. In Section 5, we propose a solution which can be executed in parallel

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with CMP functions to detect and solve selfishness. In the last section, we perform an evaluation of the proposed solution using some performance metrics such as the additional packet control overhead, the false and missed convictednodes.

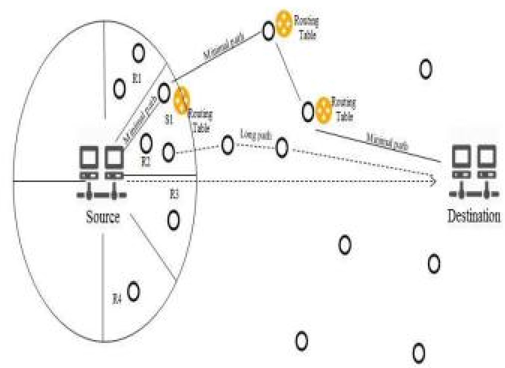
II. RELATEDWORK

A. Game Theory and wireless sensor networks

Game theory is the study of interaction of autonomousagents. It offers some benefits as a tool to analyze distributedalgorithms and protocols for wireless networks. It isa framework that allows modeling of multi-party decisionproblems and it is increasingly used as a mechanism to solve various problems in wireless networks such as routing, andenergy consumption.

WSN is characterized by a distributed, dynamic andauto-organizing architecture. Therefore, every node mustrun a distributed protocol and makes its own decisions inan independent way. These decisions may be constrainedbyrules or algorithms of coverage protocol, but ultimatelyeach node will have some leeway in setting parameters orchanging operational mode. Since sensors nodes have limitedresources and may have no globalinformations of the wholenetwork and the changing topology, it is difficult to sense theentire network; only a limited portion of the environment issensed. Therefore, a group of sensor must collaborate witheach other to accomplish a much bigger task efficiently.[4] proposed a system which is an innovative congestion control algorithm named FAQ-MAST TCP (Fast Active Queue Management Stability Transmission Control Protocol) is aimed for high-speed long-latency networks. Four major difficulties in FAQ-MAST TCP are highlighted at both packet and flow levels. The architecture and characterization of equilibrium and stability properties of FAQ-MAST TCP are discussed.

ARCHITECTUREDIAGRAM



III. Modules

Node Creation and Configuration:

Node creation is nothing but the creation of the wireless nodes in the network scenario that is decided. Node configuration essentially consists of defining the different node characteristics before creating them. They may consist of the type of addressing structure used in the simulation, defining the network components for mobile nodes, turning on or off the trace options at Agent/Router/MAC levels, selecting the type of ad-hoc routing protocol for wireless nodes or defining their energy model. Simulator::node-config accommodates flexible and modular construction of different node definitions within the same base Node class. For instance, to create a mobile node capable of wireless communication, one no longer needs a specialized node creation command.

Recursive Shortest Path:

To estimate distances between two non-neighboring sensors ss and st where st / ∈Ss , our algorithm follows two main steps. First, given the two sensors (or vertices) of a static and directed network (or graph), all possible paths with the minimum number of hops between ss and st need to be obtained. Second, the algorithm evaluates each path assuming that every edge eij∈ E belongs to the shortest path

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betweenss and st ,so the length of the path is obtained based on the known one- hop distance, rij where s j ∈ Si . Finally, the non-neighboring distance estimate between the two end sensors is calculated as the mean of all evaluated pathdistances.

Region level energy balance:

The objective of RLEB is to spread the forwarding task around the sender node fairly such that the surrounding nodes deplete their energy at the same time. EGT is employed to achieve this objective. We assume the total number of packets sent by the sender is _, which represents the total population of region level evolutionary game (RLEG). The goal of employing EGT is to find the stable proportion distribution of packet population in all sub-regions in order to make all sub-regions consume their energy at approximately the same time. This stable vector is called the equilibrium packet proportion distribution vector or stable state. packet through a sub-region depends on i) packet transmission and reception energies, ii) number of nodes in that region Nk, and iii) number of packets sent through this region.

Node level energy balance:

Node level energy balance the objective of NLEB game is to balance the energy consumption in a sub region by selecting one forwarding node from nodes in the sub-region node. This game is formulated as an player non-cooperative mixed strategy game. Such that the following conditions are satisfied: i) the number of player nodes is greater than or equal to two, and ii) network connectivity is maintained with minimum routing overhead. Forwarding probability is greater than its Nash equilibrium and will wait for a round trip time (RTT) or until it overhears the forwarded packet by any other nodes. If the node does not overhear the packet, it will gradually decrease its forwarding probability until the packet is forwarded either by itself or by another node. A node is considered dead when its remaining energy drops below Etx+Etr. When the node is about to die, it notifies itsneighbors.

Performance evaluation:

During simulation time the events are traced by using the trace files. The performance of the network is evaluated by executing the trace files. The events are recorded into trace files while executing record procedure. In this procedure, we trace the events like packet received, Packets lost, Last packet received time etc. These trace values are write into the trace files. This procedure is recursively called forevery 0.05 ms. so, trace values recorded for every 0.05 ms.

IV. CONCLUSION

This paper proposes a fully distributed routing protocol, called game theoretic energy balance (GTEB), for maximizing the lifetime of WSNs. GTEB utilizes evolutionary game to capture dynamic changes on a macro scale, classical game theoretic to capture selfish behavior of the sensor node, and the geographical routing protocol to minimize routing overhead in the network. The combination of evolutionary and classical game theoretics with geographical routing is shown to be effective in improving lifetime of the network. The simulation results showed that GTEB provides significant improvement in extending network lifetime and delivery ratio over other test protocols and competing geographical protocols. The obtained results showed that GTEB provides excellent adaptation to factors in the network, such as the network density, traffic load and asymmetric energy use. The proposed low overhead protocol can make WSNs operate longer for a given energy resource. GTEB does not currently support mobility. As common to all GRPs, GTEB needs positioning hardware in sensor nodes or alternatively, the pre-programming of node locations.

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