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A Survey on Secure Routing for Cooperative Heterogeneous Network

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ABSTRACT: Wireless sensor networks are receiving significant attention due to their potential applications ranging from surveillance to tracking domains. Optimal sensor deployment is necessary condition in homogeneous and heterogeneous wireless sensor network. The number of Sensor nodes and Relay nodes, and their locations has significant influence on optimization of network lifetime. Effective deployment of sensor nodes is a major point of concern as performance and lifetime of any WSN. In proposed system consider node deployment in a 3D environment. By considering 3D deployment network owner can deploy maximum number of sensor nodes in a limited area that results in optimization of network lifetime. Regular Hexagonal Cells are used to deploy sensor nodes at 3D locations. Deployment system in WSN explore every sensor node sends its data to the relay node having maximum energy and then it is send to the nearest sink node of the WSN. This system gives advantages over the existing system that consider node deployment in 2D environment.

KEYWORDS: 3D Sensor deployment, homogeneous, heterogeneous.

I. INTRODUCTION

a. Background

Wireless sensor networks are nowadays commonly deployed as part of the network infrastructure in diverse scenarios. For example, control of shipping traffic in port infrastructures, monitoring of urban infrastructures as bridges or tunnels, and the control and monitoring of critical parameters within critical infrastructures. The self-configuring, autonomy and cost of deployment of WSN, are good arguments for their use, and are largely responsible of their growing popularity. With the raise of concepts such as the Future Internet (FI) and the Internet of Things (IoT), that propose the interconnection of heterogeneous networks around the globe, several research works have focused on the adaptation of WSN in order to work in these and other new similar paradigms. One part of this adaptation requires the adoption of quality of service (QoS) mechanisms to ensure that the application requirements are satisfied throughout the network. The use of QoS mechanisms in WSN creates a big challenge because the traditional QoS techniques are resource-intensive and sensors are resource-constrained. Moreover, one of the major problems in WSN is power consumption, due to the fact that sensors are not usually connected to a power supply. Instead, sensors have their own battery and in some cases they are rechargeable using, for in-stance, solar power or friction, with the corresponding increase in price that this entails. Due to the difficulty that changing the battery of the sensors represents, that in most cases require human intervention, energy consumption is directly related with the lifetime of the network.

b. Motivation

Wireless sensor networks (WSNs) collect data from the physical world and communicate it with virtual information world, such as computers. Wireless Sensor Networks (WSNs) are a valuable resource for a lot of innovative monitoring applications, acting in home automation, weather monitoring, traffic management, tracking, industrial control, surveillance, among many others fields. Sensor nodes are battery powered devices it has limited power so we need to

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use it efficiently. Proper sensor deployment improves monitoring and controlling of physical environment. Proposed system is used to sensing in the target area. SNs closer to the sink node forward more packets than the SNs at the periphery of network is called funneling effect. Funneling effect causes Energy Hole problem [1]. We avoid redundant nodes for the conservation of energy. Node deployment strategy plays an important role in optimizing network lifetime. Node placement problem arise due to the undetermined locations of sensor nodes hence we have to avoid node placement problem. In wireless sensor network clustering of sensor nodes is one of the most useful methods because of its good scalability and the support for data aggregation. Data aggregation combines data packets from multiple sensor nodes into one data packet by removing same information. This reduces the transmission load and the total amount of data. With this energy consumption is reduced in clustering, because the energy load is well balanced by dynamic selection of cluster heads. As a result, nodes around sinks node die earlier than other nodes, even in clustered WSN. In a multiple-sink WSN, sensor nodes are divided into a few clusters. Sensor nodes within a cluster are connected with one sink, which belongs to that cluster. Purpose of node deployment for wireless sensor network is to deploy relay nodes dynamically in order to overcome the energy hole problem and optimize network lifetime. Relay nodes are used to communicate between sensor nodes and sink node or base station. Relay nodes transfer data from sensor nodes to the sink node. Relay nodes are deployed in such a way that maximum area should be covered. Nodes are distributed based on precise locations that are mapped on to Regular Hexagonal Cells.

II. REVIEW OF LITERATURE

There are several works focused on defining efficient routing protocols for WSN. Two possible classifications of routing technologies are based on network infrastructure (flat or data-centric, hierarchical and location-based routing) and protocol operation (proactive, reactive and hybrid) [4]. Moreover, there are additional techniques to save energy while avoiding data redundancy, as for example data aggregation [12]. This technique performs data compression by increasing the complexity of the node, although increases the lifetime by reducing the amount of data to be sent. Moreover, Tang et al [17] propose an approach to extend the lifetime of WSN while reducing delivery delay by data aggregation. Although some QoS restrictions are considered in various studies, lifetime is the most important parameter for performance in traditional WSN. For this reason, various QoS-based approaches in WSN are focused on extending the lifetime but do not consider the application requirements, and those that consider applications requirements are focused on providing real-time end-to-end guarantees [2].

Unlike routing, traffic classification is not widely studied in WSN. Indeed, traditional traffic classification has not been used by service providers to manage different types of traffic differently [1]. Moreover, traffic classification may be performed by using the statistical performance values extracted from the transmission layer that defines the behaviour of the traffic [9]. When traffic classification is used to improve the QoS, the traffic is classified according to common QoS requirements. Therefore, given that our solution will be deployed in a WSN, we have to include the energy consumption as a requirement for the calculation of the class. Rajkamal and Ranjan [1] consider the use of traffic classification for network processors in WSN. However, our aim is to enable each sensor in the network to perform data classification, the previous step to role-assignment.

Some uses for role-assignment in WSN are: role-based access control (RBAC), topology optimization and collaboration. For example, Misra and Vaish [1] use role-assignment for RBAC. Specifically, they define role-assignment based on reputation, bootstrap time and energy of the node. The aim is to define a reputation scheme in which role-assignment is used to minimize communication and delay overhead in WSN. Moreover, Dasgupta et al [7] use role-assignment in order to optimize the role-based topology of the network for maximizing the lifetime. This study is based on the existence of two roles in WSN: nodes used for information gathering and nodes used to aggregate and transmit data packets. In principle, all nodes in the network can have both roles, although some nodes are better qualified than others to perform these actions. This approach consists of using the role-assignment for increasing the lifetime without taking into account the applications requirements. Frank and Romer [1] use role-assignment to identify the functionality of nodes in WSN (e.g. gateway, cluster head) also based on topology. Finally, Weis et

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al [8] use role-assignment in sensor/actuator networks (SA-nets) to assign roles to devices based on their capabilities. The aim of this approach is to use the roles to allow the collaboration among the devices of the network (e.g. e-home). With this purpose they use a publish/subscribe infrastructure. This approach does not take into account the lifetime and is only focused on collaboration. Then, all the roles are based on the capabilities of the nodes, and the solution does not consider the energy level of the nodes. Role-assignment can be also used in conjunction with routing protocols for efficient data aggregation [4]. The main idea behind our work is to define a routing algorithm for WSN using traffic classification and role-assignment to enhance lifetime while improving QoS. This is directed to improve the cooperation between heterogeneous networks, that is key in future scenarios [5].

III. SYSTEM ARCHITECTURE

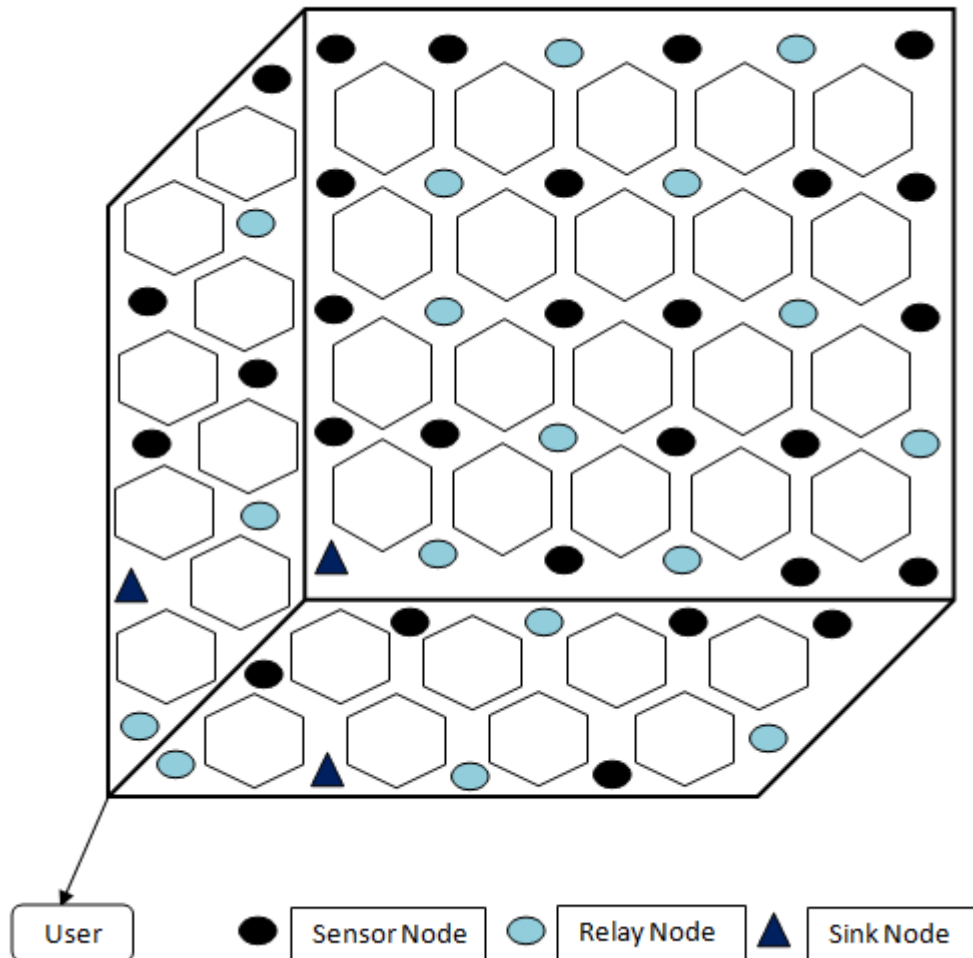


Figure:- 1 D Node Deployment Architecture

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In the node deployment strategy shown in above architecture state relay nodes and sink nodes for data transmission in wireless sensor network. Relay nodes are the nodes which are having maximum energy and acts as intermediate node for transmitting data from sensor node to sink node. Sink node is base station from which sensed data is transmitted from Wireless Sensor Network to the user. Once the nodes (i.e., SNs/RNs) are deployed, network set-up phase starts. In this phase, all SNs learn about their neighboring RNs by exchanging messages among themselves and record their assigned node ID. Here, neighboring RNs are those which are within the communication range of a SN. A SN in network chooses a RN as a receiver which is nearest to SN and has the highest residual energy for sending its data. If there is more than one receiver node with the same highest residual energy, one of them is chosen randomly. Next, the receiver RN employs the same procedure to choose the next receiver RN in the network for sending its data. This process repeats till the data arrives at the sink node.

IV. SYSTEM ANALYSIS

In this system Sensor nodes are distributed in a 2D plane covered by Regular Hexagonal Cells. In deployment strategy nodes are deployed in three phases. In first phase, VNs are deployed in some strategic locations which are located on the boundary of each layer for ensuring complete coverage of the network. In one such phase (i.e. second phase), RNs are placed at the centre of each RHC of each layer for ensuring complete connectivity of the network. After second phase of deployment, the remaining RNs are deployed uniform randomly within each RHC in third phase. The objective of the proposed node deployment scheme is achieving balanced energy consumption of VNs and RNs so that network lifetime is optimized. RHC consists of sensing range which is from the center of RHC to the boundary and communication range which is a circular section around RHCs for communication between different sensor nodes. A VN in a layer chooses a RN as a receiver which is in the same layer and has the highest residual energy for sending its data. If there is more than one receiver node with the same highest residual energy, one of them is chosen randomly this process continues till data arrives at sink node.

The location of VNs and RNs are calculated with respect to the sinks location. We assume both a VN and a RN have limited energy while an unlimited amount of energy is set for the sink. We also consider continuous monitoring applications in which each VN uniformly generates n bits packet and sends the packet to the sink through intermediate RNs at every time slot. The RNs collect packet and send them to the sink through multi-hop communication after each time slot. Each VN and RN has the same transmission range and sensing range r_s .

V. CONCLUSION

Proposed system model presents deployment of sensor nodes in Wireless Sensor Network. This algorithm has analyzed the issue of energy hole problem and node placement problem in existing systems. Node deployment strategy has significant influence on limiting energy hole problem and optimizing network lifetime. This system proposed a 3 Dimensional node deployment strategy by considering multi objective 3D environment. Using target localization to deploy sensor we select nodes which is having minimum cost for data transmission. It formulates the problems of sensing and connectivity. Coverage is one of the most important performance metrics for sensor network reflects how well a sensor field is monitored. In future work includes increase the capacity of sensor nodes by providing solar energy support to nodes which helps nodes active for long time.

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