IMPROVING SECURITY OF CLUSTER NODES IN MANETS: A TRUST-BASED APPROACH

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ABSTRACT

A Mobile Ad hoc Network (MANET) is a multi-hop wireless network in which the mobile nodes are dynamic in nature and has a limited bandwidth and minimum battery power. Due to this challenging environment the mobile nodes can be grouped into clusters to achieve better stability and scalability. Grouping the mobile nodes is called clustering, in which a leader node is elected to manage the entire network. In this paper, first we introduce various approaches for clustering focus on different performance metrics. Then, we show some clustering schemes such as Mobility-based clustering, Energy-efficient clustering, Connectivity-based clustering, and Weighted-based clustering. Finally, we present a Trust based approach for improving the reliability of cluster nodes in MANETs. A wireless network consists of geographically distributed sovereign devices and uses sensors for cooperative monitoring physical conditions. It comprises number of small, and relatively inexpensive and low-power sensors that are connected to the wireless network, constituting a wireless sensor networks (WSNs). This paper developed a purely deterministic model using Enhanced Deterministic Energy efficient Clustering Protocol (EDEC) by clustering nodes to organize the WSN. The EDEC is dynamic, distributive, self organized and more energy efficient than the existing protocols. Simulation results showed a better performance with respect to energy consumption, which is reflected in the network lifetime under both homogeneous and heterogeneous settings, when compared with the existing protocols. But by doing little amendments, by using Energy Analyzer Algorithm, we can bring even more performance in the Energy consumption in the network. The approach estimates an optimal solution for the balanced energy consumptions in ordered wireless sensor networks.

Keywords: MANET, Clustering, Cluster head, Algorithms.

OVERVIEW

An ad hoc network nature is the main cause for making it more vulnerable to wireless attacks. Ad hoc nodes are wireless in nature that makes it prone. A mobile ad hoc network (MANET) is a group of mobile hosts and able to communicate one another in the absence of fixed infrastructure. MANETs are dynamic in nature and formed by independent mobile nodes. Each device in a MANET is free to move independently in any direction, and will therefore change its links to other devices frequently. Each must forward traffic unrelated to its own use, and therefore be a router. The primary challenge in building a MANET is equipping each device to continuously maintain the information required to properly route traffic. Such networks may operate by themselves or may be connected to the larger Internet. They support multi hop routing, an autonomous and decentralized administration, dynamic changes in network topologies an energy limited operation and network scalability. Regarding MANET, comparatively, reactive routing protocols perform well than the proactive routing protocol with reduced overhead to attacks

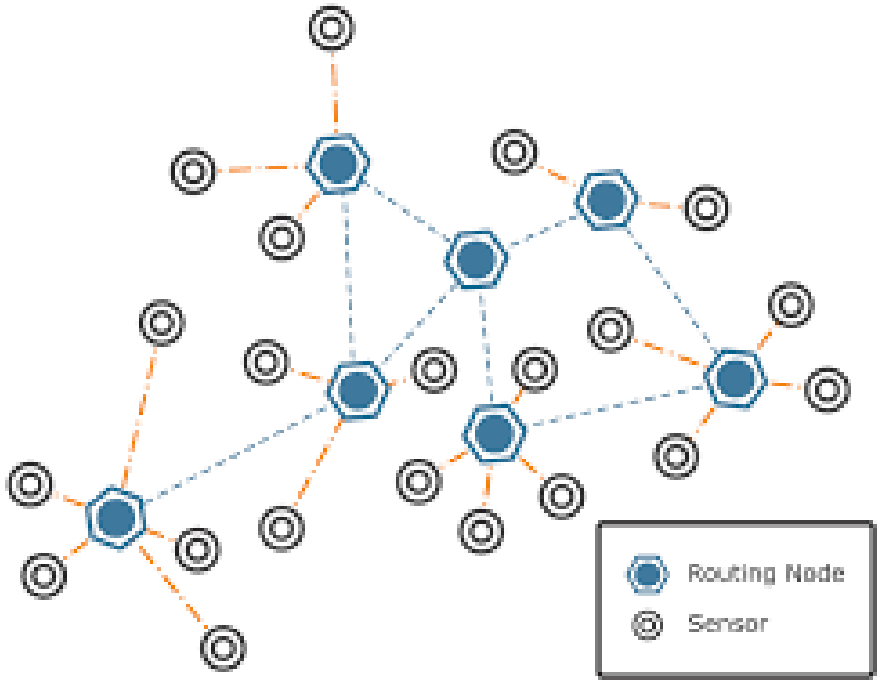
including eavesdropping, black hole, malicious, denial of service etc. An autonomous feature of ad hoc nodes is responsible for the motivation of attacks. The nodes are free to move anywhere in a wireless environment and can join or leave any network at any time. These nodes are not fully secured and can be compromised, confined or hijacked by any attackers. There is no central authority and it is assumed that all participating nodes are cooperative in nature. Many algorithms were proposed to ensure the node co-operation. The major aim of the attacker is to destroy the cooperativeness of the ad hoc nodes**.** Therefore, we exploit the EDEC routing protocol to implement in our proposed work.

AIM AND SCOPE

To identify, track and show the negative effects that malicious nodes cause in MANET (Mobile ad hoc network). To achieve the goal, we proposed Path Tracing algorithm to detect the malicious nodes using per hop distance and link frequent appearance count. To analyse and simulate the proposed work in NS2 regarding the effect of malicious nodes on network throughput, end-end delay and other such QoS constraints.

INTRODUCTION

Since wireless network interfaces became cheap and widely available at the beginning of the millennium, there has been an increased research interest in various types of wireless networks and wireless network applications. Within this research area, the focus initially was on pure ad hoc networks, providing solutions at various OSI layers to enable the interconnection of (mobile) wireless nodes without the need for any form of central infrastructure. Because of the wide applicability of wireless networks, several network subtypes emerged that essentially re-use the idea of the self-forming, self-configuring, infrastructureless ad hoc networks, but operate in specific scenarios using specialized types of hardware. Among several sub-types, wireless mesh networks and wireless sensor networks evolved into independent research topics.



In wireless sensor networks (WSN), the network nodes are considered to be part of the infrastructure and are dedicated to the routing task. The mobility of the mesh nodes is limited or zero and their processing, memory and bandwidth capacities generally exceed those of traditional ad hoc network nodes. Additionally, the power consumption requirements are often less stringent than those of wireless ad hoc networks. Conversely, wireless sensor networks (WSN) are formed between sensor devices. These devices are characterized by their small size and low cost, but are burdened with relatively low processing and memory capabilities, a limited power supply, and relatively low link bandwidths. While some

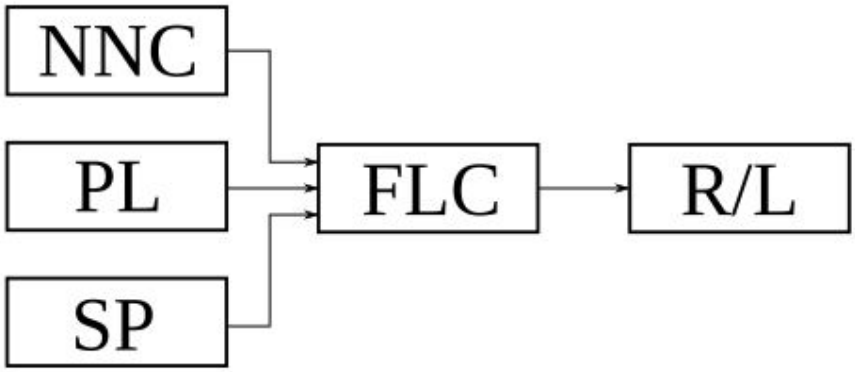
sensor devices are immobile, other sensor devices are attached.

Sensor networks can be deployed in a very similar manner. While dense in today's deployments, only a few key routing nodes are necessary to create a connected mesh network. We analyzed the network graph, the number of total nodes within the network and the number of routing nodes necessary to interconnect all the nodes. The data shows that we vastly over provision sensor network nodes by adding mesh network capabilities into each and every one of them.

PROBLEM DEFINITION

EXISTING APPROACH

- A Mobile Ad hoc Network (MANET) is a multi hop wireless network in which the mobile nodes are dynamic in nature and has a limited bandwidth and minimum battery power.
- Clustering Algorithm may consider one or more factors for cluster head selection. Some of the factors considered during cluster formation are energy, mobility behavior, degree, weight, distance and spreading degree of the nodes.
- Clustering is a technique to divide a whole network into small and self-manageable entities called cluster.
- Mobility-based Metric Clustering Algorithm, Mobility Prediction-based
- Clustering Algorithm, Mobility-based d-Hop Clustering Algorithm, Clustering Through Neighborhood Stability-based Mobility Prediction
- Mobility-based Metric Clustering Algorithm If the nodes are in transmission range of each other even after the Cluster-Contention-Interval (CCI)timer has expired, re-clustering is triggered, and the node with the lower mobility metric assumes the status of CH.
- Flexible Weighted Clustering Algorithm based on Battery Power: Flexible Weighted Clustering Algorithm based on Battery Power (FWCABP) the nodes with low battery power are preventing from being elected as a CH, minimizing the number of clusters, and minimizing the clustering overhead. In the cluster formation phase, each node broadcasts a message to inform its neighbors of its status and builds its neighbors list.
- Enhance Cluster-based Energy Conservation Algorithm: new topology control protocol that extends the lifetime of large ad hoc networks while ensuring minimum connectivity of nodes in the network, the ability for nodes to reach each other and conserve energy by identifying redundant nodes and turning their radios off.
- Max-Heap Tree Algorithm based on Energy Efficient Clustering: This algorithm is useful for minimizing the power consumption and maximizing the network lifetime.
- A Novel Genetic Annealing based Clustering Algorithm: The topology is stable and the network lifetime can be enlarged.
- CONNECTIVITY-BASED CLUSTERING ALGORITHMS: High Connectivity Clustering, 3-hop Between Adjacent Cluster Heads Algorithm, K-Hope Connectivity ID Clustering Algorithm.
- High Connectivity Clustering: In this algorithm the node with the highest number of neighbors is selected as the CH.
- 3-hop Between Adjacent Cluster Heads Algorithm: This algorithm reduces the number of CHs and eliminates small unnecessary clusters.
- FUZZY LOGIC FOR CONTROL: it is more general it mimics the way in which humans interpret linguistic. These rules are called FC rules. The "if" clause of the rules is called the antecedent and the "then" clause is called consequent. Both the input and output parameters must be linguistically defined in this stage using proper term sets. The selection of the level of granularity of a term set for an input variable or an output variable plays an important role in the smoothness of control.

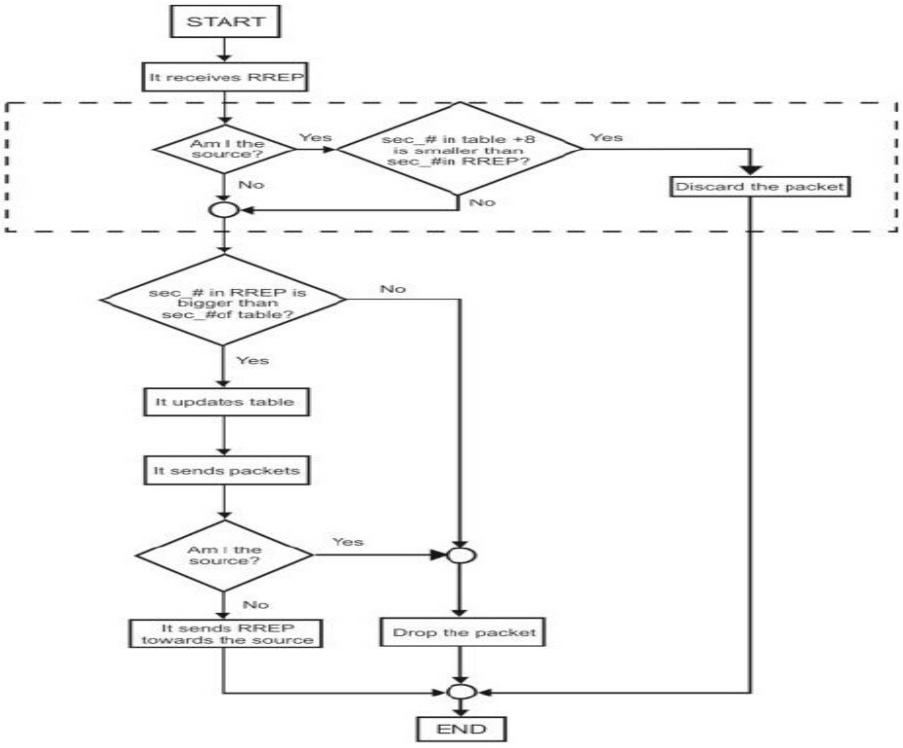


WIRELESS SENSOR NETWORK:

A wireless Senor network (WSN) is a mesh network created through the connection of wireless access points. Each node is also a provider, forwarding data to the next node. The networking infrastructure is decentralized and simplified because each node need only transmit as far as the next node. Wireless mesh networking could allow people living in remote areas and small businesses operating in rural neighborhoods to connect their networks together for affordable Internet connections. Defined as a self-configured and infrastructure-less wireless networks to monitor physical or environmental conditions, such as temperature, sound, vibration, pressure, motion or pollutants and to cooperatively pass their data through the network to a main location or sink where the data can be observed and analyzed.

A wireless sensor node is equipped with sensing and computing devices, radio transceivers and power components. The individual nodes in a wireless sensor network (WSN) are inherently resource constrained: they have limited processing speed, storage capacity, and communication bandwidth. After the sensor nodes are deployed, they are responsible for self-organizing an appropriate network infrastructure often with multi-hop communication with them.

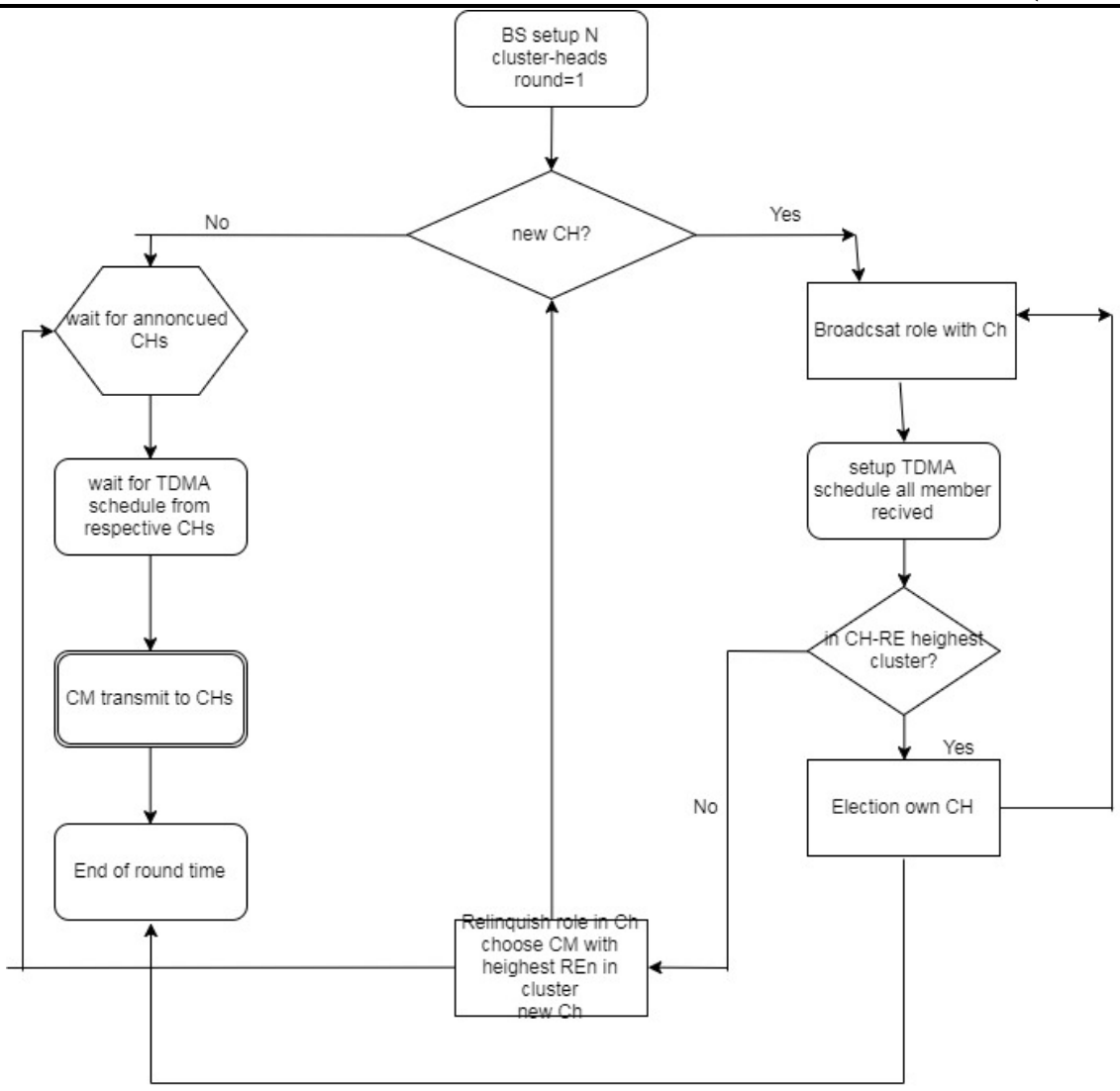
The number of failures that allowed by the network to adequately continues its function defines its fault tolerance. The hardware and the software constraints of a node affect the failure rate.



PROPOSED SYSTEM

- Enhanced Deterministic energy- efficient clustering protocol that is dynamic, distributive, self-organizing and more energy efficient than the existing protocols.
- Enhanced Deterministic Energy - Efficient Clustering protocol (EDEC) that determines CH election based on the residual energy (RE) of each node.
- EDEC improves the lifetime of wireless sensor networks by an order of magnitude which is significant when compared with LEACH, SEP and SEP-E. It takes advantage of the local information.
- EDEC protocol to a real world application setting such as in agricultural farmland for fertilizer spraying operations.
- EDEC has been able to distribute the energy consumption in the WSN evenly among the nodes, hence the nodes die out almost at the same time.
- It is our hope that this method can provide more insight into optimizing WSN energy consumption in real-world scenarios.

This integrates the functions of network discovery, automatic routing control, and transmission scheduling. So we proposed to present a effective energy saving method in WMN module that provide the clustering approach. WSN module is based on Time Division Multiple Access (TDMA) protocol and is sensitive to timing control. Performance in an actual experiment was evaluated. The proposed WSN module was evaluated and compared to XBee, an off-the-shelf product. The average PDR (Packet_Delivery_Ratio) and standard deviation.



Flow chat of EDEC Diagram

Advantages of Proposed System:

Implement the Clusrter head to transfer the information to Processor and fast transformation.

To reduce the Energy consumption in the Sensor Network, To analysis the Packet Delivery ratio and Average delay because of proposed Routing method.

Compare and Increase Performance by using Clustring approach.

CONCLUSION AND FUTURE ENHANCEMENTS

Implement the Clusrter head to transfer the information to Processor and fast transformation. To reduce the Energy consumption in the Sensor Network, To analysis the Packet Delivery ratio and Average delay because of proposed Routing method Compare and Increase Performance by using Clustring approach.

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