Review Paper on Lifetime Optimization and Security in Wireless Sensor Network using Cost-Aware Secure Routing Protocol (CASER)

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Abstract— The Wireless sensor network is a self-organized wireless network system constituted by numbers of energy-limited micro sensors under the banner of industrial application (IA). In this project, a secure and efficient cost aware securer routing protocol to address two conflicting issues: they are lifetime optimization and security. Through the energy balance control and random walking the conflicting issues are addressed. Then discover the energy consumption, is several disproportional to the uniform energy deployment for the given network topology, which greatly reduces the lifetime of the sensor networks. To solve this problem an efficient non-uniform energy deployment strategy is used to optimize the lifetime and message delivery ratio under the same energy resource and security requirement. It is also to provide a quantitative security analysis on the proposed routing protocol. We also demonstrate that the proposed CASER protocol can achieve a high message delivery ratio while preventing routing traceback attacks.

Key words: Routing, Security, Energy Efficiency, Energy Balance, Delivery Ratio, Deployment

I. INTRODUCTION

The recent technological advances make wireless sensor networks (WSNs) technically and economically feasible to be widely used in both military and civilian applications, such as monitoring of ambient conditions related to the environment, precious species and critical infrastructures. A key feature of such networks is that each network consists of a large number of untethered and unattended sensor nodes. These nodes often have very limited and non-replenish able energy resources, which makes energy an important design issue for these networks. The routing is another very challenging design issue for WSNs. A properly designed routing protocol should not only ensure high message delivery ratio and low energy consumption for message delivery, but also balance the entire wireless sensor network energy consumption, and there by extend the sensor network lifetime. Motivated by the fact that WSNs routing is often geography-based propose a geography-based secure and efficient Cost-Aware secure routing (CASER) protocol for WSNs without relying on flooding. CASER allows messages to be transmitted using two routing strategies, random walking and deterministic routing, in the same framework. The distribution of these two strategies is determined by the specific security requirements. CASER protocol has two major advantages:

- It ensures balanced energy consumption of the entire wireless sensor network, so that the lifetime of the WSNs can be maximized,
- CASER protocol supports multiple routing strategies based on the routing requirements, including fast/slow message delivery and secure message delivery to prevent routing trace back attacks and malicious traffic jamming attacks in WSNs.

II. EXISTING SYSTEM

In existing system geographic routing is used as then promising solution in the network. Geographic adaptive fidelity is used as the promising solution for the low power sensor network. A query based geographic and energy aware routing was implemented for the dissemination of the node. In Geographic and energy aware routing (Gear), the sink disseminates requests with geographic attributes to the target region instead of using flooding. Each node forwards messages to its neighboring nodes based on the estimated cost and the learning cost. Source-location privacy is provided through broadcasting that mixes valid messages not only consumes significant amount of sensor energy. But also increases the network collisions and decreases the packet delivery ration. In phantom routing protocol each message is routed from the actual source to a phantom source along a designed directed walk through either sector based approach or hop based approach. The direction sector information is stored in the header of the message. In this way, the phantom source can be away from the actual source. Unfortunately, once the message is captured on the random walk path, the adversaries are able to get the direction sector information stored in the header of the message.

III. PROPOSED SYSTEM

To overcome this drawback new scheme is implemented and named as CASER. Here the data that is used for the secure transmission is energy balancing. Thus development of the proposed scheme is used for the energy balancing and for secure transmission.

A secure and efficient Cost Aware Secure Routing (CASER) protocol is used to address energy balance and routing security concurrently in WSNs. In CASER routing protocol, each sensor node needs to maintain the energy levels of its immediate adjacent neighboring grids in addition to their relative locations. Using this information, each sensor node can create varying filters based on the expected design trade-off between security and efficiency. The quantitative security analysis demonstrates the proposed algorithm can protect the source location information from the adversaries. In this project, we will focus on two routing strategies for message forwarding: shortest path message forwarding, and secure message forwarding through random walking to create routing path unpredictability for source privacy and jamming prevention.

IV. SYSTEM OVERVIEW

The Energy Balance Control (EBC) is the one of the problem in wireless sensor network. Here we discuss about the EBC.

A. *Energy Balance Control (EBC)*

To balance the overall sensor network energy consumption in all grids by controlling energy spending from sensor nodes with low energy levels. The source node sends the message to neighbouring nodes, then move to the next neighbouring node.

The Fig 1 shows that, the data is sent the source node to destination node based on the neighbour's node selection. The EBC is the Energy Balance control; it is used to calculate the energy. The energy is calculating based on the EBC algorithm. First select the neighbouring node for message forwarding. If the node is has the highest node means select that node. The sink node has the information about the entire node, that information is stored to the sink node. The source node, sends the message to neighbouring nodes, then move to the next neighbouring node. Finally the message is send to sink node. In wireless sensor network, sink node has the all node information. The EBC method is used to calculate the energy for the sensor node.

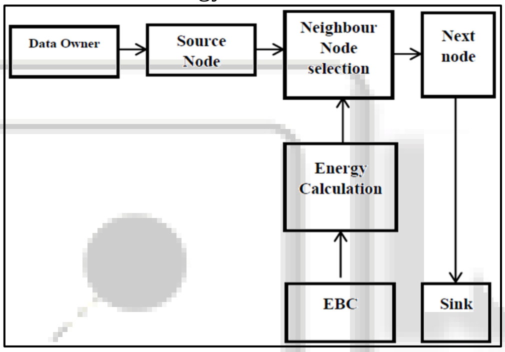

Fig. 1: System Overview

V. MODULES DESCRIPTION

There are three modules:

- Shortest path Allocation
- Energy Balance Routing
- Secure Routing Using CASER

A. *Network Partition*

The network is evenly divided into small grids. Each grid has a relative location based on the grid information. The node in each grid with the highest energy level is selected as the head node or message forwarding. In addition, each node in the grid will maintain its own attributes, including location information remaining energy level of its grid, as well as the attributes of its adjacent neighbouring grids. The information maintained by each sensor node will be updated periodically. We assume that the sensor nodes in its direct neighbouring grids are all within its direct communication range. We also assume that the whole network is fully connected through multi-hop communications. In addition, through the maintained energy levels of its adjacent neighbouring grids, it can be used to detect and filter out the compromised nodes for active routing selection.

B. *Energy Balance Routing*

In the selection of the neighbouring node selection the energy level of each node to be considered. To achieve the energy balance, monitor and control the energy consumption for the nodes with relatively low energy levels. To select the grids with relatively higher remaining energy levels for message forwarding. For parameter α,αε[0,1] to enforce the degree of the energy balance control. It can be easily seen that a larger a corresponds to a better EBC. It is also clear that increasing of a main they also increase the routing length It can effectively control energy consumption from the nodes with energy levels lower than $\alpha\ \varepsilon_{\alpha}(A)$.

The CASER path selection algorithm is derivate by the equation,

$$\varepsilon_{\alpha}(A) = \frac{1}{|NA|}\sum_{i\in NA} \varepsilon ri$$

Here is ε a parameter used for the Energy Balanced Control. And then the term α used to denote challenging ratio. If the α value is maximum means there is no shortest path in that node.

C. *Secure Routing using CASER*

In the proposed model the data that are transmitted according to the routing strategy. A routing strategy that can provide routing path unpredictability and security. The routing path become more changeable the routing protocol contains two options for message forwarding: one is a deterministic shortest path routing grid selection algorithm, and the other is a secure routing grid selection algorithm through random walking.

1) *CASER Steps*

- Step 1: Find the neighbour grid for all grid
- Step 2: Compute the average remaining energy of adjacent neighbour grid, (1)
- Step 3: Select the head node based on the highest energy level for packet transmission (2)
- Step 4: Choose the routing type
- Step 5: Select the random number γ € [0, 1]
- Step 6: If γ > β, the node will send the message through the shortest path, which is deterministic routing
- Step 7: Otherwise transmit the packet through the randomly selected neighbouring grid, which is random walk routing.

VI. CONCLUSION

In this paper, we presented a cost aware secure and efficient routing protocol for WSNs to balance the energy consumption and increase network lifetime. CASER has the flexibility to support multiple routing strategies in message forwarding to extend the lifetime while increasing routing security. We also proposed a non-uniform energy deployment scheme to maximize the sensor network lifetime. In experimental results, we can increase the lifetime and the number of messages that can be delivered under the non-uniform energy deployment. Our analysis and simulation results show that we can increase the lifetime and the number of messages that can be delivered under the non-uniform energy deployment by more than four times.

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