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Cost-Aware Secure Routing (CASER) protocol for wireless sensor networks

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ABSTRACT

Lifetime optimization and security are two conflicting design issues for multi-hop wireless sensor networks (WSNs) with non-replenishable energy resources. In this paper, we first propose a novel secure and efficient Cost-Aware Secure Routing (CASER) protocol to address these two conflicting issues through two adjustable parameters: energy balance control (EBC) and probabilistic-based random walking. We then discover that the energy consumption is severely disproportional to the uniform energy deployment for the given network topology, which greatly reduces the lifetime of the sensor networks. To solve this problem, we propose an efficient non-uniform energy deployment strategy to optimize the lifetime and message delivery ratio under the same energy resource and security requirement. We also provide a quantitative security analysis on the proposed routing protocol. For the non-uniform energy deployment, our analysis shows that we can increase the lifetime and the total number of messages that can be delivered by more than four times under the same assumption. We also demonstrate that the proposed CASER protocol can achieve a high message delivery ratio while preventing routing traceback attacks.

Keywords— CASER, Sensor lifetime, Energy consumption, Security

1. LITERATURE SURVEY

The recent technological networks feasible to be widely used in both military and civilian applications. The nature of such networks makes energy consumption, communication delay, and security the most essential issues for wireless sensor networks. However, these issues may be conflicting with each other. The existing works generally try to optimize one of these key issues without providing sufficient diversity and flexibility of various other requirements in protocol design. In this dissertation, we investigate the relationship and design trade-offs among these conflicting issues

2. CASER: COST AWARE SECURE ROUTING PROTOCOL

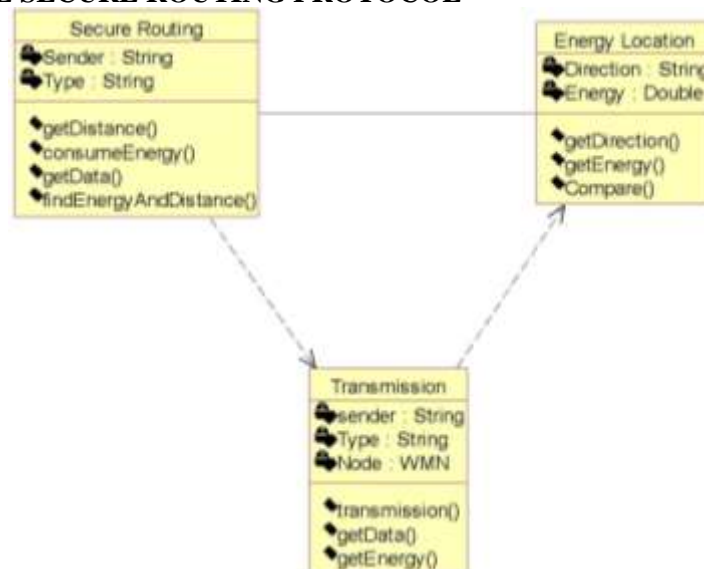


Fig. 1: Class diagram

We 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. This scenario is analogous to delivering US Mail through USPS: express mails cost more than regular mails; however, mails can be delivered faster. The protocol also provides a secure message delivery option to maximize the message delivery ratio under adversarial attacks. In addition, we also give quantitative secure analysis on the proposed routing protocol.

Disadvantages of existing System

1. More energy consumption.
2. Increase .the network collision.
3. Reduce the packet delivery ratio.
4. Cannot provide complete security for packets.

Advantages of Proposed System

1. Reduce the time delay.
2. Balanced energy consumption.
3. Maximize the lifetime of wireless sensor networks.
4. Secure message delivery.

3. MODULES

1. Network Creation
2. Routing
3. Energy balance control
4. Security

3.1 Network creation

In this module, we are designing the wireless sensor network by giving node size. When we give the node size, the network divided as four grids such as upper direction, down direction, a backward direction, and forward direction. And in our network, we have only one Sink node and it is the only destination for all nodes. We can assign the node IDs to recognize nodes by the sink node in the message transmission.

3.2 Routing

In this module, we have two types of routing strategies are designed and their names are deterministic routing and random walk. After giving the node size, we have to choose the type of routing in the network. If we choose deterministic routing, EBC parameter will work in the network. If we choose random walk routing then along with EBC, Random walk parameter also worked in the network to deliver a message from a sender to sink node.

3.3 Energy balance control

Through the EBC, energy consumption from the sensor nodes with relatively lower energy levels can be regulated and controlled.

3.4 Security

The selection of shortest path routing and random walking strategies is probabilistically controlled by the security level.

4. SCREENSHOTS



Fig. 2: Welcome screen

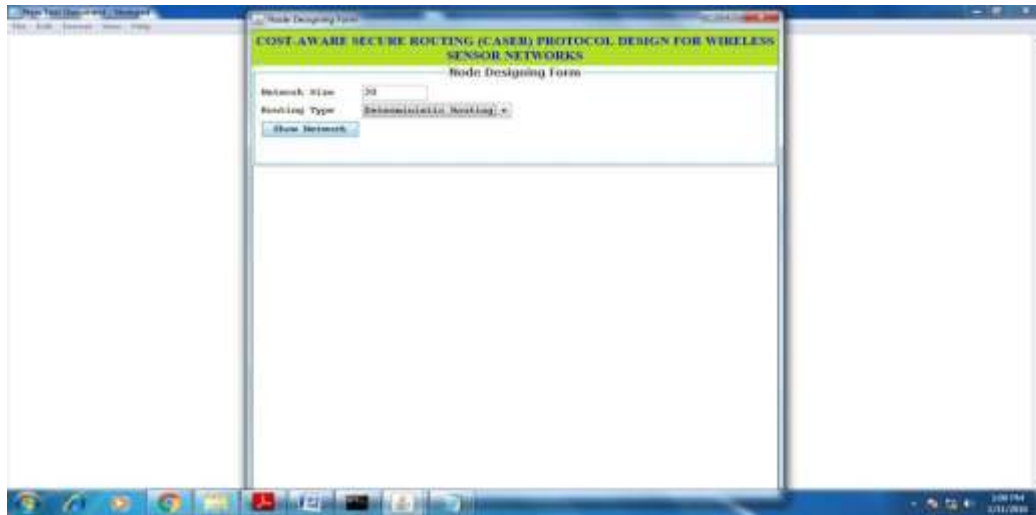


Fig. 3: Node designing form

5. CONCLUSION

In this paper, we presented a secure and efficient Cost-Aware Secure Routing (CASER) 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. Both theoretical analysis and simulation results show that CASER has an excellent routing performance in terms of energy balance and routing path distribution for routing path security. We also proposed a non-uniform energy deployment scheme to maximize the sensor network lifetime. 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.

6. REFERENCES

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