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Survey on Sinkhole Attack Detection in WSN

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ABSTRACT

Wireless Sensor Network security is the important consideration of the aspect of security. Sensor networks are deployed for various applications due to their usability and cost effective nature. Designing a network is a critical part of the designer of the network while considering the security aspect. It is prone to all types of attacks by the intruders. The most important attack is sinkhole attack in WSN. This paper presents an analysis on the security issues of wireless sensor network.

SURVEY ARTICLE

Keywords: security, intruder, sinkhole attack, issues

Abbreviations: WSN-Wireless Sensor Networks

1. INTRODUCTION

A Wireless Sensor Networks consists of a large number of tiny nodes that can sense the environment and send the collected data to the base station. It consists of a radio transceiver and receiver and a transmitter.WSN are applicable in areas like military surveillance and monitoring and healthcare applications especially in remote areas. The nature of the sensor nodes make it suitable to many types of attacks .Security is an important issue in WSN. Different types of cryptographic algorithms have been developed to avoid and predict such types of attacks and provide the solution. Sinkhole attack is a critical attack in WSN. This paper gives a study and reviews about sinkhole attack.

2. LITERATURE REVIEW

The protocol used (Ranjeeth Kumar, 2015) is Low Energy Adaptive Clustering Hierarchy (LEACH) protocol. This uses its routing operation to detect the intruder in the network an IDS mechanism. In the proposed algorithm, the detection metrics, such as the number of packets transmitted and received are used to compute the Intrusion Ratio (IR) by the IDS agent, based on the computed numeric or non-numeric value in turn indicates the normal or malicious activity. The IDS system detects the sinkhole attack by the IR then the IDS agent alerts the network about the intruder node. The data transmission is not continued through the sinkhole node.

ETARF (Pushkar A. Chavan et al., 2015), a robust trust aware routing for WSNs against intruders in multi hop routing. This approach does not use any time synchronization or known geographic information to find the route from source to destination. Instead, it finds the shortest efficient route using the shortest path algorithm. This algorithm routes the logical link on the physical path with the least hop count. The results shows that energy savings and bandwidth through clusters and data aggregation.

An approach (Leovigildo Sánchez-Casado et al., 2015]) to detect sinkhole attack in MANETs with AODV routing. It focuses on the contamination borders formed by legitimate nodes under the influence of intruders. The information collected form neighbour nodes at regular intervals are used to find the sink holes.

A novel approach (Fang-Jiao Zhanga, 2014) for detecting serious security problems like sinkhole attack using redundancy mechanism. Multi paths are used for sending the messages. After evaluation of the replies the attacker nodes are identified. The simulation results show the effectiveness of this approach.

There are two approaches (Shafiei, 2014) to detect and prevent sinkhole attacks. A centralized approach in turn detects attack in the suspicious regions in the network. A Geostatistical hazard model is used in this approach. The second approach, viz distributed monitoring detects a malicious approach to explore every neighbourhood in the network.

A Secure Energy Efficient Adhoc Routing Security (Rajani B. Patil and Dhanashree Kulkarni, 2014), is obtained through shared cryptography. A minimum Hop Routing is used for routing. Opportunistic algorithm provides multiple paths from source to destination. Information which has to be communicated is divided into multiple shares. The information is sent from source to destination through the multiple paths. Security is maintained through application of a secret sharing algorithm at source. The result of the simulation shows energy efficiency in terms of cost of security in warm hole, sinkhole attacks.

The simulation study (Fabrice Le Fessant et al., 2012) using a set of parameters such as network scale, position and the number of malicious nodes and impact of the different attacks. The study presents, a detailed metrics on malicious attacks. They have proposed a novel design of two simple and resilient protocol topology based reconfiguration.

An intrusion detection system (Ioannis krontiris, 2008) for Wireless sensor networks that can detect sinkhole attacks. The study in the approach explains how sinkhole attacks can be launched in realistic networks. This method uses the MinRoute protocol of TinyOs. The concept behind MinRoute is use of the link quality metric to build the routing tree. Rules are applied for detection of the intruder node with IDS system. The simulations results obtained in their approach shows the accuracy of the algorithm.

A sinkhole attack (Kim, 2007) that attempts to heavy network traffic to single sinkhole node in MANET. This approach focuses on the DSR protocol in MANET. Sinkhole indicators analyse the sinkhole problem and detect the sinkhole node. The intrusion detection algorithm used is incremental learning algorithm. The simulation results obtained show the effectiveness and reliability in detection of intrusion detection of sink hole.

3. CONCLUSION

This paper presents the important aspect of security in WSN. The major issue in sensor network is sinkhole attack. Here the third party tries to collect the information passes it between the source and destination. This paper surveys different approaches to detect and algorithms that are used to prevent the attack.

DISCLOSURE STATEMENT

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