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An Efficient Dissemination and Dynamic Risk Management in Wireless Sensor Network

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Abstract- *A sensor cloud is comprised of several multifarious wireless sensor networks (WSNs). These WSNs may have different owners and run a wide variety of user applications on demand in a wireless communication medium and there are possibilities for various security attacks. Thus, a need arises to construct suitable security measures that protect these applications which got affected from several attacks . Before deploying any kind of security measures it is essential to analyze the impact of different attacks and their cause-consequence relationship. In this proposed method, a risk assessment framework is developed that enhances the efficiency and security of the sensors deployed. This framework is mainly based on the concept of code dissemination which propagates a new program image or relevant commands to sensor nodes through wireless links, after a wireless sensor network (WSN) have been deployed. The result will be generated in the form of PDF which provides the user with the sufficient knowledge about the risk occurred in various regions. Along with the PDF, solutions are also provided to overcome the risks identified and the solution act as a caution which will avoid the cause of risk.*

***Index Terms*- Security; Risk Assessment; Wireless Sensor Networks; Code Dissemination; Denial-of-Service.**

Introduction:

Data mining can likewise be connected to different types of information, for example, information streams requested or sequenced information, chart, or arranged information, spatial information, content information, sight and sound, and WWW [12].

The list items of a client inquiry are regularly returned as rundown now and again called hits. The hits may comprise of website pages, pictures, and different sorts of documents [12]. Assume a web crawler needs to give setting mindful question suggestions i.e. at the point when a client represents a question the web crawler tries to gather the setting of the inquiry utilizing the client's profile and his inquiry history keeping in mind the end goal to return more tweaked answers within a fraction of a second.

The Collaborative tagging is a mechanism in which the resources called web links can be classified into tags based on the end-users necessity. When the collaborative tagging is primarily used to assist tag-based resource discovery and browsing, it could also be utilized for other purposes [5]. The tags possessed by the bookmarking service are used to intensify the web performances like content filtering and classification based on the user [2]. However, to achieve this enhanced use, the current architecture of collaborative tagging services must be extended by including a policy layer. The objective of this layer will be to impose user choices, purposely denoting resources on the basis of the set of tags associated with them, and, possibly, other parameters concerning their trustworthiness (the percentage of users who have added a given tag, the social relationships, and characteristics of those users, etc.).

Existing System:

Several code dissemination protocols have been proposed to propagate new code images in WSNs. Deluge is included in the TinyOS distributions .However, since the design of Deluge did not take security into consideration, there have been several extensions to Deluge to provide security protection for code dissemination .Among them, Seluge enjoys both strong security and high efficiency. However, all these code dissemination protocols are based on the centralized approach which assumes the existence of a base station and only the base station has the authority to reprogram sensor nodes. Unfortunately, there are WSNs having no base station at all. For Example a military WSN in a battlefield to monitor enemy activity a WSN deployed along an international border to monitor weapons smuggling or human trafficking, and a WSN situated in a remote area of a national park monitoring illegal activities. Having a base station in these WSNs introduces a single point of failure and a very attractive attack target. Also, the centralized approach is inefficient, weakly scalable (i.e., inefficient for supporting a large number of sensor nodes and users), and vulnerable to some potential attacks along the long communication path.

Proposed System:

In this project, we propose a risk assessment framework for WSNs in a sensor cloud that utilizes database. Using our proposed risk assessment framework allows the security administrator to better understand the threats present and take necessary actions against them.

1. A distributed approach can be employed for code dissemination in WSNs. It allows multiple authorized network users to simultaneously and directly update code images on different nodes without involving the base station.

2. Another advantage of distributed code dissemination is that different authorized users may be assigned different privileges of reprogramming sensor nodes. This is especially important in large scale WSNs owned by an owner and used by different users from both public and private sectors.

3. Very recently, an identity-based signature scheme to achieve secure and distributed code dissemination is proposed. In this project, we further extend this scheme in three important aspects.

Firstly, we consider denial-of-service (DOS) attacks on code dissemination, which have severe consequences on network availability, as well as propose and implement two approaches to defeat DOS attacks.

Secondly, the proposed code dissemination protocol is based on a secure and efficient Proxy Signature by Warrant (PSW) technique.

Thirdly, we consider how to avoid reprogramming conflict and support dynamic participation.

A secure distributed code dissemination protocol should satisfy the following requirements

1. Integrity of Code Images
2. Freshness
3. DOS Attacks Resistance
4. Node Compromise Tolerance
5. Distributed
6. Supporting Different User Privileges
7. Partial Reprogram Capability
8. Avoiding Reprogramming Conflicts
9. User Traceability
10. Scalability
11. Dynamic Participation

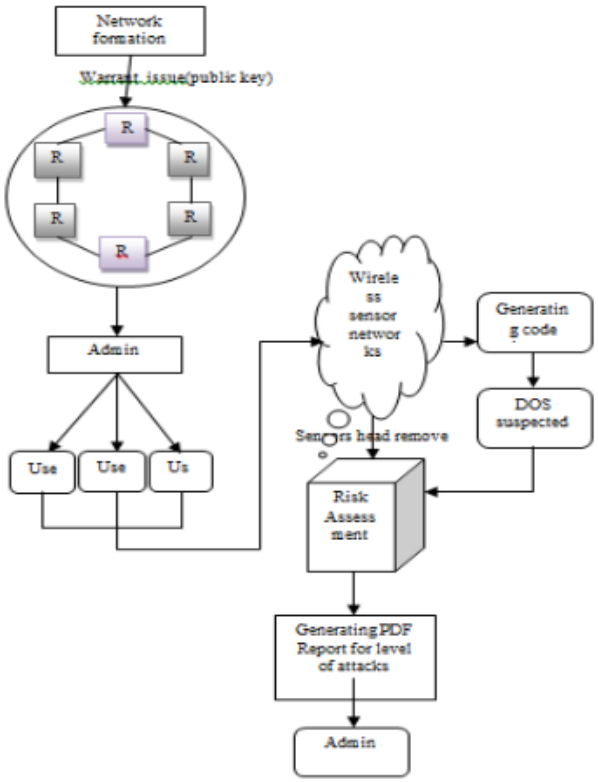
To satisfy the above requirements, we propose in this paper a practical secure and distributed code dissemination protocol which is built on the PSW technique.

There are seven attacks performed in this paper namely,

1. Key Mismatch
2. User Exists
3. Registered region
4. Old Version
5. Hash Fail
6. Denial of Service(DOS)
7. Access Over

At last, we take risk assessment of every attacks based on impact level of each attack in a network.

Fig.1: Architecture Diagram



A. Network Formation & User Registration

A Network is first formed with different regions. Regions are splitted based on the Sensor ranges .The Regions are fully controlled by Network Admin. Keys are shared with the Sensors in different Region by the Network Admin. User Requests are processed and Keys are issued for issuing warrant. Only the public key of the network owner is pre-loaded on each node before deployment.

Attacks: Registered region

If a user present in network by registering one region, the same region cannot be registered by any other users.

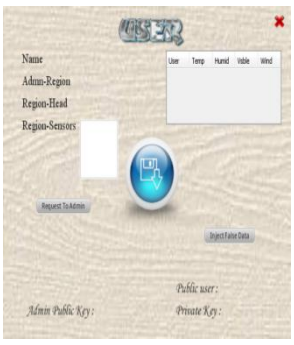


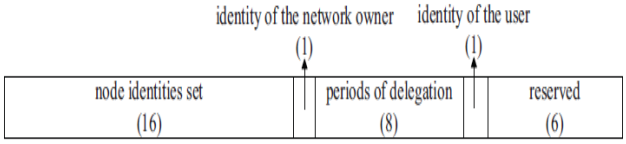
Fig.2.1: Network Admin Fig.2.2:User Registration

B. Installing Code Image

Proper registration of user is updated in admin table. After a Network is deployed, Admin should provide issue warrant to User for describing the User privileges, that the User is able to update Code Images. There are three steps involved in this module.

System Initialization

User registers to the Network Admin. After verifying his/her registration information, the network owner assigns an identity for him. Then the network owner computes a proxy signature key for user .The warrant *mw* records, the identity of the network owner and the user privilege such as the sensor nodes set with specified identities or/and within a specific region that user is allowed to reprogram, and valid periods of delegation.



User Pre-processing

Assume that user enters to the WSN and has a new program image. User generates the Code Image with the proxy Key given by Admin. Here the targeted node identities set field indicates the identities of the sensor nodes which the user wishes to reprogram. User cannot control the Regions beyond the warrant description. If he tries he will be denied by the Warrant of admin .User Checks the genuineness of warrant with the Pre-Shared public Key of Admin.

Sensor Node Verification

Upon receiving a signature message each sensor node verifies it as follows:

The node firstly pays attention to the legality of the warrant *mw* and the message *m*. For example, the node needs to check whether the identity of itself is included in the node Identities set of the warrant *mw*. Also, according to the valid periods of delegation field of warrant *mw*, the node can check whether reprogramming service to a user is expired. Only if

The above verification passes, the node believes that the message *m* and the warrant *mw* are from an authorized user.

Attacks: Key Mismatch, User Exists, Old Version

-Admin asks its public key to every new user entered into a network, if user reply wrong public key of admin means, admin removed the user from network.

-For example, if a user named as Ravi present in network, mock user (Ravi) cannot be register again.

-Code generation is only by using new versions; otherwise it will become an attack.

C. Resisting DOS:

The Region Head Checks periodically weather a DOS is suspected .If found from a User it validates the User by asking a puzzle periodically before data send. In particular, the node attaches a unique puzzle into the beacon messages and requires the solution of the puzzle to be attached in each signature message. The node commits resources to process a signature message only when the solution is correct .If the answer for the puzzle is correct it sends the data. Otherwise it informs all nodes in the Region about the Attack and suggests to drop User and not to send data further to the specified User. Now the DOS Attacker is dropped and the corresponding region free for other Users.

Attacks: Access Over, DOS

-If a user exceeds warrant, access over attack is performed.
-If an attacker generates code continuously, then DOS is suspected.

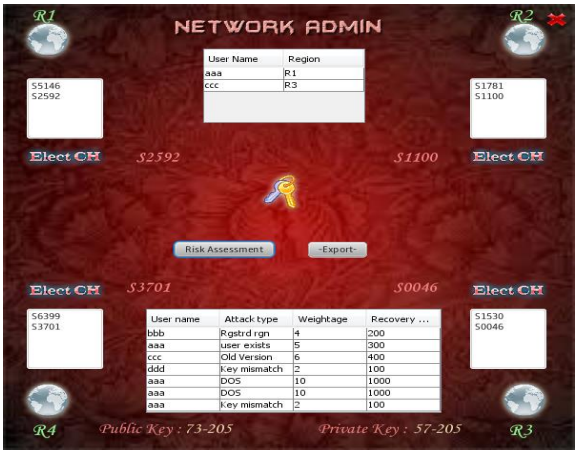


Fig.3: Resisting attacks

D. Predict Impact level of attacks & report to admin

For each and every attacks, weightage and recovery cost is calculated. Database contains six fields namely type of attackers, attacker's name, type of attack, time of attack, recovery time of attack and impact level of attacks. The impact level of attack is updated based on the value of weightage, recovery cost and recovery time of attacks. Then, this database is exported to PDF to admin. PDF also contains description of each attacks performed in network.

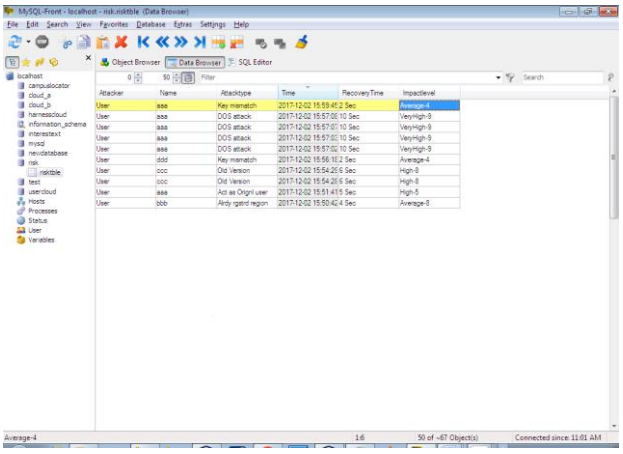


Fig.4.1: Predicting attacks

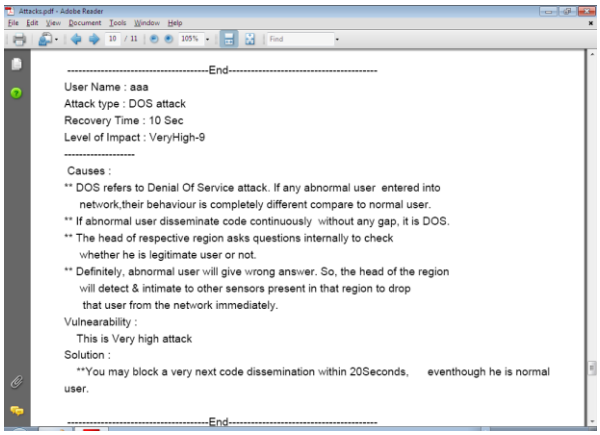


Fig.4.2: Report

Conclusion:

In this project, we have presented a risk assessment framework for WSNs in a sensor cloud environment. We depicted the cause-consequence relationship for attacks on WSNs using database. Thus, we deployed Code Images securely in distributed manner and had taken risk assessment of every attacks successfully. The proposed risk assessment will also be used to determine how efficient a security measure will be, which can be measured in terms of resource utilization and the capability to reduce the overall threat level to WSN security parameters.

Enhancement

- Intimate to admin about the attacks performed in network periodically, in order to take necessary steps for preventing these attacks in future.
- Maintain database which includes overall attacks information with recovery cost rather than plot in graph.

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