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"Energy Optimization in Wireless Sensor Networks"

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Abstract: *The energy inside the Wireless Sensor Nodes are having low memory and least battery life. Due to this the main energy is utilized during sending of the data. Some part of energy is utilized in processing the data due this problem, we need a process by which the energy consumption can be manage. In this will consider the cost of sending as well as processing. So, we will use short distance path as well as compression of the data to reduce the power consumption. To designed and implemented it, a dynamic trust-aware routing framework for dynamic WSNs. trustworthy and energy-efficient route. Most importantly, It proves effective against those harmful attacks developed out of identity deception; the resilience of it is verified through extensive evaluation with both simulation under various scenarios*

Keywords: *Wireless Sensor Network, Energy optimization, compression, efficiency*.

I. Introduction

A wireless sensor network is a set of sensors in a physical environment. These sensors have limited resources in terms of computing, storage, communication, etc. However, the fact that communication is the most costly in terms of energy consumption for a sensor node, a common goal for the applications of WSNs is to reduce the amount of data to be transmitted as much as possible. These data are generally sensor measurements to be collected and routed to a collection point using a multi-hop communication. One possible approach to reduce this amount of data is to use data aggregation. Data aggregation significantly reduces energy consumption and, therefore, is fundamental to many applications of WSNs.

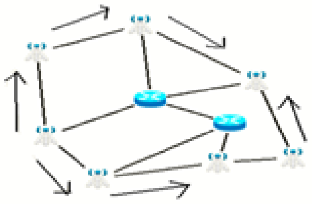
It is found that the area of wireless network and mobile computing is evolved fastly. When we compare Wireless network with wired networks, we have more benefit with wireless networks as they are capable of scaling easily, rapidly deployable. Wireless networks most importantly cost effective. Sensor nodes are low-power devices that is having inbuilt functionality of sensing, sensor nodes are having small amount of computing and wireless communication. We look for secure routing for data collection tasks, which are one of the most fundamental functions of WSNs. In a data collection task, a sensor node sends its sampled data to a remote base station with the aid of other intermediate nodes Though there could be more than one base station, our routing approach is not affected by the number of base stations; to simplify our discussion, we assume that there is only one base station. An adversary may forge the identity of any legal node through replaying that node's outgoing routing packets and spoofing the acknowledgement packets, even remotely through a wormhole. Since a node in a WSN usually relies solely on the packets received to know about the sender's identity, replaying routing packets allows the malicious node to forge the identity of this valid node. After "stealing" that valid identity, this malicious node is able to misdirect the network traffic. For instance, it may drop packets received, forward packets to another node not supposed to be in the routing path, or even form a transmission loop through which packets are passed among a few malicious nodes infinitely. It is often difficult to know whether a node forwards received packets correctly even with overhearing techniques. In an emergent sensing application through WSNs, saving the network from being devastated becomes crucial to the success of the application. Every sensor node is usually equipped with

a battery, microcontroller and transceiver . Sensor nodes are generally set with communication and processing capability.

In wireless sensor networks efficiency of energy is an important issue . Hierarchical routing is a professional way to minimize the energy consumption within a cluster. However, because the cluster heads (CHs) closer to the sink node are burdened with heavy traffic, they drain much faster than other CHs Protocols and sensor network algorithms should have capability of self - organizing. Thus, routing protocols design should increase network lifetime and utilize maximum node energy, also WSN routing networks should be simple with few calculation's , little delay in data transferring from nodes to the Sink

, minimum energy consumption . In this view , so many protocols and algorithms have been designed. One of the methods is hierarchical method. By this method, lots of data aggregation methods could be done in every cluster. Clustering methods have a few advantages. The first one is that they split network to some different regions and each region is managed by a Cluster Head. The second one is to decrease data redundancy because of data aggregation by the Cluster – Head (CH) . Sensor networks organization in the clustered architecture lead to several clustering algorithms at recent years [4].In fact Cluster -Heads can aggregate, process and filter the data send by cluster members, then reducing network bandwidth. Clustering saves energy power. Many applications are required for wireless sensor net works (WSN) to self - organization of a network into clusters. Cluster creates a hierarchical structure over a flat network. In this paper we have present a clustering.

II. Functional Block diagram:



Flow chart:

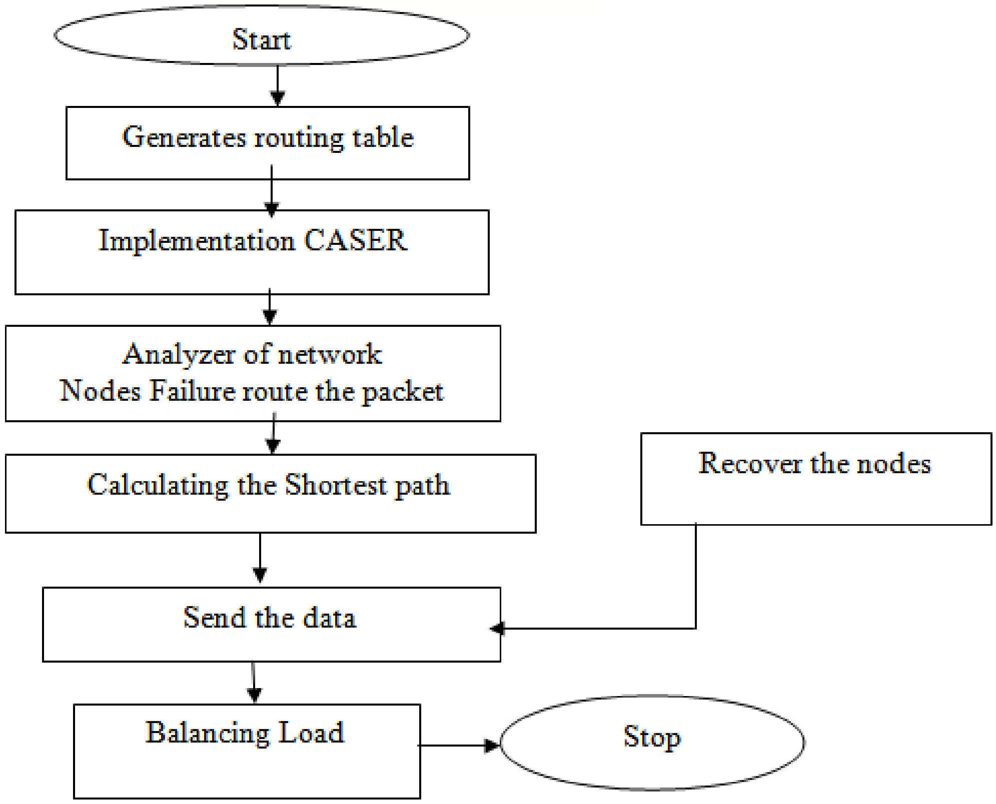


Figure1. System flow

If the process start it maintain the routing table and generate the routing list. As per the implementation of caser it analyze the failure nodes and using shortest routing path send the data and balance the load. It also recover the failed node send the another data from the node.

2.1 Algorithm

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. CASER support secure delivery to prevent routing trackback attack and malicious traffic jamming attack in Wireless Sensor Network. This combinational technology helps to improve the recovery scheme

Step 1: Network creates and forward the data

Step 2: Check the node is active or not

If $Ea>N_A$

Send the data from the path

Else if $Ea< N_A$

Then node is fail &applies the recovery scheme send the data

Else If faulty nodes repair
Then Active the previous path
Else nodes fail
Step 3: Update the routing table and select the shortest path for data transfer
Step 4: Stop
Since Ea(A) is defined as the average energy level of the nodes in N_A.N_A is the selected hop grid from the network node.

III. Literature Survey

Sr. No	Title	Author /year	Simulator	Parameter	Algorithm	Result
1.	**"**Using ambient intelligence to extend network lifetime in wireless sensor networks"	R.-C. Chen 2015	Cloudsim	Minimize the energy consumption within a cluster	algorithm for the LEACH	increases lifetime of the network. The simulation results the proposed protocol is outperforme
2	Cluster based Multipath Routing Protocol for Wireless Sensor Networks	Suraj Sharma and Sanjay Kumar Jena 2015	Castalia 3.2	The basic idea is to reduce the load of the sensor node by giving more responsibility to the base station (sink).	Neighbor Discovery and Topology Construction	the control packets are exchanged for neighbor maintenance, cluster heads selection, cluster formation, route discovery, establishment and maintenance.
3.	Base Station Controlled and Energy Efficient Centralized Hierarchical Routing Protocol	Vinesh Jain2015	DDEEC using MATLAB	proposed algorithm only 60% nodes are dead after 5000 rounds.. Thus the proposed solution increased the network lifetime during data transmission.	non-cluster routing algorithm.	increases the network lifetime, decreases the no of dead nodes during transmission,
4	Abdul Rehman Khan, Nitin Rakesh, Abhay BansaP and Dev Kumar Chaudhary,"Comparative Study ofWSN Protocols",	Abdul Rehman Khan 2015	PEGASIS,	Performance Metrics Hop Count", "Estimated Transmission Count", "Estimated Transmission Time" and "Energy Consumption".	LEACH	This makes TEEN protocol a wise choice so as to increase the longevity of the wireless sensors in the network.
5.	Energy harvesting in wireless sensor networks: A comprehensive review	Shaikh, F.K., & Zeadally, S. (2016).	using MATLAB	proposes a Prediction FREe Energy Neutral (P-FREEN)	using an ANN.	It is worth noting that each energy source has different harvesting capabilities and, as a result, the harvester hardwaredesign is also different for each category which ultimately determines the efficiency of the

						harvester

Problem Definition

Inadequate to address this challenge of energy efficient. Though traditionally considered unsuitable for networks, one approach is to distribute the network selection decisions over the users, as the device is the only entity aware of actual connectivity conditions, and real-time conditions in the device t ensures balanced energy consumption of the entire 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.

IV. Challenges – Existing Phase

4.1 Energy Efficient

There are two approaches by which energy efficient can be implemented in WSNs. One approach especially applicable to flat WSNs is for an intermediate node to feedback maliciousness and energy status of its neighbor nodes to the sender node (e.g., the source or sink node) who can then utilize the knowledge to route packets to avoid nodes with unacceptable maliciousness or energy status. Another approach which we adopt in this paper is to use local host-based for energy conservation.

Energy cost For a node N, the energy cost of a neighbour is the average energy cost to successfully deliver a unitsized data packet with this neighbor as its next-hop node, from N to the base station. That energy cost is denoted as E. Wireless Sensor Nodes are generally having less memory and low battery life. Due to this constraint, we need a strong algorithm by which we can reduce the energy consumption. The main energy is utilized during sending of the data. Some part of energy is utilized in processing the data. In this paper, we will give another approach for reduced energy consumption. We will consider the cost of sending as well as processing. So, we will use short distance path as well as compression of the data to reduce the power consumption. We have designed and implemented , a robust trust-aware routing framework for dynamic WSNs. Without tight time synchronization or known geographic information, TARF provides trustworthy and energy-efficient route. Most importantly, TARF proves effective against those harmful attacks developed out of identity deception; the resilience of TARF is verified through extensive evaluation with both simulation and empirical experiments on large-scale WSNs under various scenarios. The decisions will evolve to the equilibrium point at which the payoff of every user is maximized given the decisions of others and no one can benefit by choosing other networks unilaterally. Compared with the perfect rationality assumption in traditional game theory, it is more realistic to consider the users to be with bounded rationality. We assume that the users are able to perform best response to current state but these users lack the ability to predict the behaviors of others based on previous behaviors. Therefore, considering the dynamics of network selection and bounded rationality of users, evolutionary game approach is more suitable to investigate the decisions of users over time. In this paper, we investigate the dynamics of network selection with incomplete information in heterogeneous wireless networks. In particular, a Bayesian game is formulated by considering users with different bandwidth requirements. Since the preference (i.e., utility) of the mobile user is private information, each user has to make the decision of network selection optimally given only the distributions of the preferences of other users

To reach the equilibrium distribution, many iterations of network selection need to be performed to construct the convergence trajectory. Within an epoch, describes the path from the initial distribution state to its best response distribution. And at next selection epoch, this best response distribution is considered as the initial state. Therefore, the network selection distribution at network selection epoch m can be obtained from The impact of system parameters (e.g., learning rate and handover cost) on the equilibrium distributions will be analyzed analytically in next section. Inadequate to address this challenge. Though traditionally considered unsuitable for cellular networks, one approach is to distribute the network selection decisions over the users, as the device is the only entity aware of actual connectivity conditions.

V. Proposed Methodology

To avoid the excessive state-update overhead and to expedite the connectivity restoration process, prior work relies on maintaining multi-hop neighbor lists and predetermines some criteria for the node's involvement in the recovery.

Multi-hop-based schemes often impose high node repositioning overhead, and the repaired inter-actor topology using two-hop schemes may differ significantly from its prefailure status.

i. Number of deployed actors (N): This parameter affects the node density and the WSAN connectivity. Increasing N makes the WSAN topology highly connected.
ii. Communication range : All actors are assumed to have the same communication range.
iii. The value of affects the initial WSAN topology. While a small creates a sparse topology, a large boosts the overall connectivity
iv. Total travelled distance: reports the distance that the involved nodes collectively travel during the recovery. This can be envisioned as a network-wide assessment of the efficiency of the applied recovery scheme.
v. Number of relocated nodes: reports the number of nodes that moved during the recovery. This metric assesses the scope of the connectivity restoration within the network.
vi. Number of exchanged messages: tracks the total number of messages that have been exchanged among nodes. This metric captures the communication overhead.
vii. Number of extended shortest paths: reports the total number of shortest paths between pairs of nodes. that get extended as a result of the movement-assisted network recovery. Shortest paths are calculated.
viii. Shortest paths not extended: reports average number of shortest paths that are not extended per topology: This metric assesses how serious the potential path extension.
ix. The messaging overhead dramatically grows as the node count increases. On the other hand, requires maintaining one-hop neighbor information for performing the recovery. Thus, an extra N message overhead is considered for to exchange information initially at the network startup.

VI. Conclusions

The paper has introduced the nature science inspired methods for controlling and managing wireless sensor networks. To establish design of the networking environment, we should have scientific basis. The importance of the inter disciplinary approach like natural science can be used for establishing the new environment to networking engineering problems. The network demands great dynamism in the networking environment. It will be based on dynamics of the system which will be scalable, self organized and adaptive. Fortunately, the natural processes essentially have such characteristics and that's the reason why the naturally inspired approach is so important. To learn from the natural science is not just an analogy, but a scientific basis of the interdisciplinary science/engineering approach, which is now widely recognized as a source of the innovation in the next generation technology

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