

Energy Efficient Routing Strategies for Large Scale Wireless Sensor in Heterogeneous Networks

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Abstract: The efficiency of a wireless sensor network depends on its life time. By conserving the energy of each sensor for increase in the network lifetime. The basic operations of a wireless sensor network are sensing [1]. The data to the energy sink term is for next transmitting node. The communication or routing [2], process operation be allowed in any operations for all nodes [3]. We propose to select a specific collection of nodes for communication with considering the importance of wireless sensor where security [4] and power usage [5] is taken as top priority.

Keywords: Transmitting node [6], neighboring node [7], energy sink [8].

1. Introduction

A typical Wireless network has large number of nodes with sending and computation capabilities. The common tasks are monitoring the process by sensors, communicating to the nodes in the network and development of path for less power consumption in sensor data transmission. Wireless sensor networks (WSNs) [9] integrated with the leading edge technologies, such as sensing, micro electromechanical systems (MEMS), wireless communication, and distributed information processing, have emerged as the time requires. A wireless sensor network is comprised of a large number of small and cheap sensor nodes. Steps followed are:

- Deploying the nodes in network with global addressing.
- Connecting to sensors when data communication is needed.
- After each node communication, updating the node allocation table.
- Sensors deactivation after no path for communication (for efficient energy consumption)
- Listing all the active nodes and sensors in network.
- Waiting list of connections or communication which are registered in network (helps in security terms if node is registered in network)
- Repeatedly node communication terming as one batch (Ranking each node).

Normally, the nodes of a wireless sensor network have limited energies. Due to the one-off deployment, it is difficult

to replenish the energies. Due to the different duty and equipping for the sensor nodes, the energy consumption will be different

Among them. So, it is an energy heterogeneous sensor network.

Routing protocols will be responsible for discovering and maintaining energy efficient routes and make communication reliable and efficient.

A. Implementation overview

In this paper, we are proposing a new paradigm of energy efficiency in various wireless sensors. We performed real-time integration from NA2 with variant sensors. We did bi-directional data Synchronization between different sensors. This section enumerates the detailed architecture of the grouping nodes and communicating via sensors in keeping both energy and security issues as top priority.

2. Design and development

Heterogeneous sensor networks mean a network composed of a variety of different types of sensor nodes. As per the basic steps we have taken, we will discuss each in implementation way:

- Deploying the nodes in network with global addressing [10]. In a communication network where we have a wireless devices there is more chance of getting the data sharing over a number of devices. We consider the aspect of data sharing as main goal in wireless devices from every node to another node but with registered id (R-NID) [11] in the network. Whenever a node is ready to communicate to the available registered device we first make that node to register in the network with basic information and generate an ID for the new node, after getting id that is termed in network global addressing. The network table is updated and repeated communication to this node is then moved as cluster (where each cluster has specific attribute grouped together).
- Connecting to sensors when data communication is needed. The authentic node termed till now is only as

Table 1
The attributes

Node no	R-NID	Global address	SID/RID	Flag
Each node number with (n1,n2,n3...nk)	Each with 16-bit of short address and prefixed with an level of communication (01,02,03 &04)	Each of 16-bit address and hierarchically	Alpha number sender and receiver id with general rules on framing the length with 63.	Flags are 01 for new node registered, 02 for already registered but not sensor used, 03 for sensor used for already established connection and 04 for new sensor and new node communication

Table 2
Basic data frame

Data type	Data stream	Length	Receiver address
Fixed data type is recommended to get rules for security issues	Data type decides the stream to be in uni or bi directional	Length is fixed to 16-bit data	16-bit

global addressing. But the node is not fully ready to get data transfer. So, an sensor will be set for each device with global addressing .suppose we have three node and 1 sensor then the active node [12] termed and ready for communication are assigned to sensor data transfer mode: the switch [13] in and the switch off action are internally termed for sensor to start data transfer with two parameters (one is sender global address and other is receiver global address). After the communication is over an signal from the receiver is sent to deactivate the connection (basically and unsc signal sent [14]). Further if any node is ready to send data the sensor is connected with the node (basically with synchronous signal).

- After each node communication, updating the node allocation table. Each node data transfer will be repeatedly get done with updation of nodes strategy as a table in network. The attributes get updated are (node no, R-NID, global address, SID/RID [15], flag[16]).
- The R-NID is assigned a 16 bit short address, which is unique within a WPAN [16] or SMAG [17] domain, and remains fixed irrespective of its location within the WPAN. All three levels of addresses are created hierarchically.16 bits short addresses are assigned to a R-NID at the time of deployment.
- Sensors deactivation after no path for communication (for efficient energy consumption) Node with global addressing and frame of data (data type, data stream, length, receiver address) are updated in communication path as sensor request is given by each node as SYNC and UNSYNC. The method of allocation depends on the priority and with security terms checked in each access and request. Basic security terms and priority scheduling is used and then establishes the connection with GRANT SYNC signal from each node. Basic data frame is shown in Table 2.
- After each communication the data end of node establishment is decided by signal-SYNC and GRANT SYNC for every UNSYNC signal.
- Listing all the active nodes and sensors in network.
- The node communication is updated in table with sensor user and active nodes using them. (Node id,

sensor id, receiver id, sensor id) the collection of information is repeatedly updated and if any sensor is damaged then the data is resend to the sender with an flag signal set to nonzero value. This non-zero value is always generated when the sensor is in active (damaged, no signal, not working or any other technical problems).

The collection of node is termed as Cluster by following rules:

- Repeatedly two registered nodes communicating to each other.
- Two or more registered nodes sending or receiving the same type of data frames.

A. Active node

This term is taken for every node which is in network with global addressing and registered id and ready to receive and send data with sensor acceptability. The wireless channel is symmetrical. The energy consumption for transmitting one bit from node to node is equal to the energy consumption for transmitting one bit from node to node.

B. Active sensor

This term is for more than an important role in network synchronization and non-synchronization nodes. Technically problem devices are not treated as active sensors. Waiting list of connections or communication which are registered in network (helps in security terms if node is registered in network). In network we may have less sensors and more nodes leading to nodes in waiting stage, but it's an serious issue and to solve this we take the time sequencing of each sensor and when time sequence is less than 3 seconds then and device slicing is done which helps to dedicate to new node and simultaneously do the pending transmission with BI-SYNC signal.

Repeatedly node communication termed as one batch (Ranking each node). Ranking each node is done in respect to active node, active sensor and clustered nodes. The data nodes are updated with established connections with successful data transmission. The priority of node in communication is treated as clustered node as top priority.

The following are the rules taken for terming the batch of node or CLUSTER and ranking:

Table 3
 Sensor and when time sequence

Sensor	Sender node	Receiver node	Type of signal from sensor		Max. Time slot of transmission	Meaning
Sensor1	Node1	Node2	SYNC		10 minutes	Transmission of data in progress
	Node3	Node1	REQ		5 Minutes	Request for sensor by node3
Sensor1	Node1	Node2	SYNC		3 minutes	Transmission of 7 minutes over pending is 3 minutes
Updating the network table with sensor slicing for node1			BI-SYNC		Nil time	Updating progress
Sensor1	Node1	Node2	SYNC		2 minutes	About to completion of transmission
	Node3	Node1	BI-SYNC		5 minutes	Transmission about to start
Updating the network with sensor non-slicing for node1 after checking time slot <3 minutes and node1 is released as status UNSYNC			SYNC		Node3 slot is set	Transmission is started
Sensor1	Node3	Node1	SYNC		4 minutes	Transmission in progress

- Nodes with similar data transmission and with same attributes.(CLUSTER)
- In cluster a set of nodes which are first registered and has global address are known as ranking one (CLUSTER1-Rank1-node address). And so on for next clusters.

networks based on uneven clustering, EDEUC (Energy-Distance Efficiency Based on Uneven Clustering), which constructs an optimal path to the base station with multihops by cluster-heads. The EDEUC strategy can reduce the energy consumption of the nodes and prolong the life cycle of sensor networks effectively.

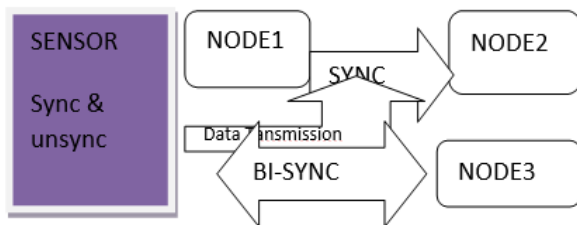


Fig. 1. Architecture of sensor network

3. Conclusion

In this paper we have given only the idea of proposed importance of sensor and communication in wireless devices where the security and energy is efficiently used by making the node in UNSYNC mode of sensor. Further we will also write the details of techniques we are planning for sensors and nodes data transmission. In this paper, we proposed a routing algorithm for multilevel energies heterogeneous sensor

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