International Journal For Technological Research In Engineering
Volume 4, Issue 11, July-2017 *ISSN (Online): 2347 - 4718*

WIRELESS SENSOR NETWORKS: A COMPLETE REVIEW

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Abstract: Wireless Sensor Network (WSN) has attracted many concerns in different domains because of its special features. A WSN is a set of a large number of resource constrained sensor nodes which have abilities for information detection, data processing, and short-range radio communication.WSN can be used for both military applications and civil applications with the tasks such as detection and monitoring of significant events in different environments or large areas. How to improve the reliability of WSN is one of the essential challenges for WSN from theoretical research to actual application. Reliability is the main issue in the Wireless Sensor Networks (WSN). Reliable data transport is an important facet of dependability and quality of service in wireless sensor networks. In this paper, the various techniques proposed for minimizing the energy consumption have been discussed. This is done primarily to give an overview of the various techniques known today for reliable data transport problem and minimizing the energy consumption in wireless sensor networks.

I. INTRODUCTION

Wireless sensor networks (WSNs) are large networks consisting of small sensor nodes (SNs), with limited computing resources used to gather , process data and communicate. A major challenge in a lot of sensor network applications requires long period of life for network survival, which leads to high consumption of energy. The small sensor nodes are devices driven by battery and due to its high energy demand, the conventional low-power design techniques and structure cannot provide an adequate solution [1]. Wireless sensor nodes normally run on disposable batteries, which have a finite operating life. Based on the application and availability of potential ambient energy sources, using energy harvesting techniques to power a wireless sensor node is a wonderful thing to do. Wireless Sensor nodes have wide range of applications in our day to day activities. Ranging from a Bluetooth equipped chest band that convey human heart rate to a treadmill, wireless electrocardiograph (ECG) temporarily connected to communicate human cardiac activity to a doctor, Zigbee equipped smart meter that monitors energy usage in a household and provides feedback to the user for decision making [2]. In general, wireless sensor nodes applications include structural monitoring, industrial monitoring, security, location tracking, and radio frequency identification (RFID). These wireless sensor nodes will work efficiently for several years between battery replacements. This can be accomplished by the utilization of energy harvesting, using surrounding sources to draw out the life of the batteries in wireless sensor nodes.

EHWSNs are made out of individual nodes that notwithstanding detecting and wireless communications are equipped for extricating energy from multiple sources and changing over it into usable electrical power. In this area we depict in subtle elements the architecture of a wireless sensor hub with energy harvesting abilities, including models for the harvesting hardware and for batteries.

II. SYSTEM ARCHITECTURE OF A WIRELESS NODE WITH ENERGY HARVESTERS

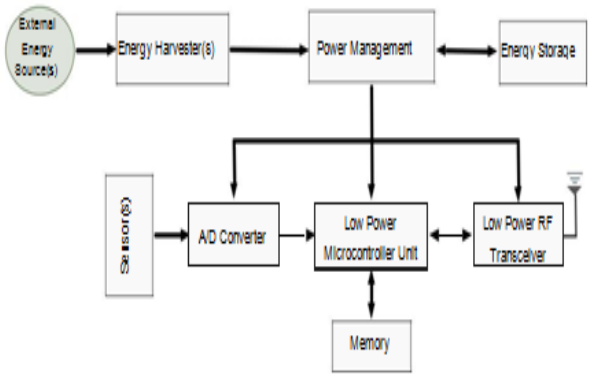

Fig 1 System architecture of a wireless node with energy harvesters

The system design of a remote sensor hub incorporates the accompanying com-ponents (Figure 1):

1) The energy harvester(s), responsible for changing over outside encompassing or human-created energy to power;
2) A power administration module, that gathers electrical energy from the reaper and either stores it or conveys it to the next system parts for quick use;
3) Energy storage, for conserving the harvested energy for future usage;
4) A microcontroller;
5) A radio transceiver, for transmitting and receiving information;
6) Sensory equipment;
7) AN A/D converter to digitize the analog signal generated by the sensors and makes it available to the microcontroller for further processing, and
8) Memory to store sensed information, application-related data, and code.

III. ENERGY FLOW IN SENSOR NETWORK

The classification of energy harvesting is based on the fact that sources they are using for obtaining the electrical energy. As For example solar harvesting devices scavenge solar energy from sun and convert it into usable electrical energy for wireless sensor networks. The different form of

energy sources for energy harvesting are solar energy from sun, thermoelectric generators, wind turbines, mechanical vibration devices such as piezoelectric devices, electromagnetic devices and photovoltaic cells[4] . There are various properties which can characterize a portable energy supplier are described by Fry, et al. [5]. These are characterizing into electrical properties, physical properties, environmental properties, operational properties and maintenance properties. Physical properties involve size, shape and weight. Environmental properties involve water resistance and operating temperature range and electrical properties include power density, maximum voltage and current. As a result, energy harvesting techniques have the potential to address the tradeoff between performance parameters and lifetime of sensor nodes. The challenge lies in estimating the periodicity and magnitude of the harvestable source and choosing which parameters to tune and all the while dodge untimely energy depletion before the following energize cycle. As a component of this examination, we display subtle elements of energy harvesting techniques—architectures, energy sources, storage technologies and cases of uses and system organizations. Further, as said above, sensor hubs can abuse energy harvesting chances to powerfully tune framework parameters. These adjustments have intriguing ramifications on the outline of sensor organize applications and arrangements, which we examine.
There are various other uses' of these energies in other domain of our living. As these sources of energy comes natural in the environment and have no cast. The use of this energy for large scale application such as agriculture, high voltage electrical plants etc. have already been done and technologies are very advance. But these advance technologies are no longer applicable for small scale application such as providing power back up to wireless sensor networks. So in this paper i present the review on work done for energy harvesting for wireless sensor network. They are such as.

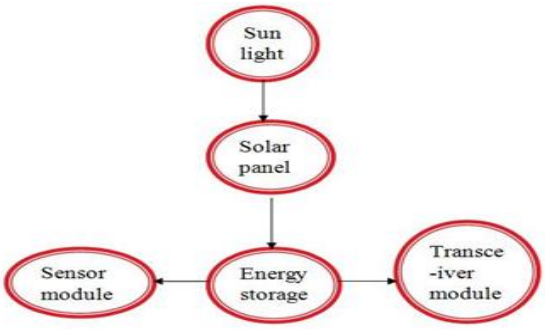

Fig 2 Energy Flow in Sensor Network

IV. ROUTING PROTOCOL

Author names Routing algorithm is used by the routing protocol to determine optimal network data transfer and communication paths between network nodes. There are number of parameters to classify and compare different routing protocol. Classification of Routing Protocols A WSNs may be have arranged in four ways, steering way foundation, organize structure, convention operation based, initiator of correspondence and application outline of system as appeared in beneath figure

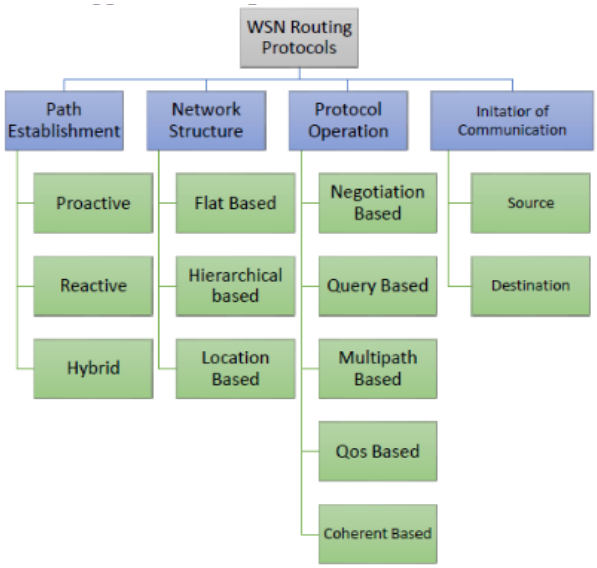

Fig: 3 Classification of Routing Protocol.

V. IB LEACH Protocol

This protocol is the enhanced form of LEACH protocol. The advantages and disadvantages of IB LEACH protocol are:

Advantages of IB LEACH protocol:
1. High cluster stability.
2. Scalability of the network is easy.
3. Most efficient protocol to balance the load in wireless network.
4. Energy efficiency is very high in comparison to other routing protocol.

Disadvantages of LEACH protocol
1. High delivery delay
2. Complexity of the algorithm of this protocol is little bit high.

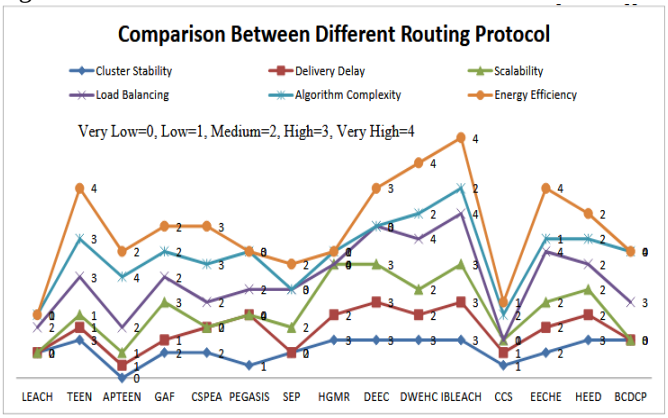

Fig 4: Comparison of Different Energy Efficient Routing Protocols page.

VI. CONCLUSION AND FUTURE RESEARCH

Outlining Efficient Energy Routing Protocol is the principal necessity for WSNs, in light of the fact that after some round sensor hubs are dead. The Number of rounds relies on the energy of individual sensor which is measured in joule/hub. The estimation of these rounds is diverse for each directing

protocol which might be around 300 or 500 in the event that we give energy of 0.25 or 0.5 joule to hub individually. In this way, now we have a need to plan energy proficient steering protocol which keeps sensor alive for quite a while or for long adjusts. In this paper, we have checked on many research papers which essentially centered around Energy Efficient Routing Protocol for WSNs. We have looked at many Routing protocol in a few angles. These papers secured numerous Energy Efficient Routing Protocols for WSNs yet at the same time change is required. Additionally research would be founded on many issues which are not shrouded in existing protocol.

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