

Literature Survey on Energy Efficient Wireless Mesh Network during Environmental Monitoring

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Abstract:- In today’s fast industrial growth the important global environmental issue is reduction of co2 emission. Recently fast growth of communication wired and wireless communication like mobile communication becomes increasingly popular with consumers. The wireless mesh network (WMN) is most likely favorite wireless access. WMN provides the wireless connectivity through the sensor to the consumer lot economical and much more supple backhaul infrastructure as compared with the wired network solutions. The wireless networking solutions for upcoming future has been adopted by most emerging technology known as wireless mesh network(WMN). Due to the consumption of maximum energy in that petricular the field of ICT industries which will direct impact on our environment i.e. co2 emission, energy efficiency and life of network becomes a important key factor to evaluate the performance of WSN and WMN. This survey paper is a primarily focuses on the classifications of the different layers and the humble approaches which are devoted to the conservation of energy. It also survey for energy saving concepts for wireless mesh networks.

Keywords:- WSN:- Wireless Sensor Network ,WMN:- Wireless Mesh Network, 802.11 Routing Protocol, MAC Protocols.

I. INTRODUCTION

In era of communication the worldwide consumption of energy is the major concerns experienced by the governments throughout all the nations reason is the environmental pollution footprints and eventual exhaustion[1] the days are not too far that in future that the main conventional energy sources are replace by the non conventional energy sources which will use the sustainable energy just like wind , solar energy and special attention to green networking which is recently attracted.

Networks has been develop and constructed in such a way that their cost and performance has been taken into granted only but as far as energy consumption is concern we have to take the co2 footprint i.e. Carbone footprints[2]

By the application of green networking to the wireless mesh network has been describe in literature very rarely. Wireless mesh networking is a technology has been used in green networking for wireless networking solutions. Hence

we have to take wireless sensor in wireless mesh networks. The rapid deployment of self configuration makes the WMN appropriate transient demands [3]

The network deployment scenarios such as hard to wired building and disaster recovery process. Therefore wmn is now being a extensively used as coverage extensive prolongation as well as the cost effectiveness and backhaul relaying with IEEE standers which are used in wireless mesh technology. In this survery one important factor which is to be considered that is the life of wireless mesh network means we will prolong the life of network by using different clustering.[4]

WMN has capture the interest of academic research and industries it will satisfy both the necessary basic requirements of ISP and wireless users. An open source wmn networking module is one of them[5]

Fig 1 shows the wireless mesh network architecture[6] which consist of different nodes called as mesh points or MP these nodes of one network can communicate with other nodes of other networks which is in mesh.it consist of mesh access point MAP and mesh point portal MPP. MPP is a gateway to integrate WMN with various networks. It may be Wi-Fi or Wi Max

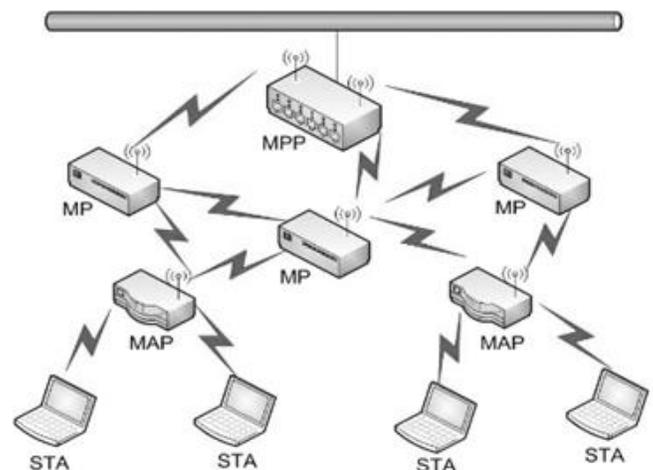


Fig.1:- Wireless mesh network in WLAN

Another wireless moduled has bee proposed by Hsiao Hsien Lin and His Yuan Tsai[5] a wireless module design with open source in hardware as well as software hence it

will wmn network that experiment can be modify depending upon the different applications. The typical node which is integrated in this module is shown in fig. 2

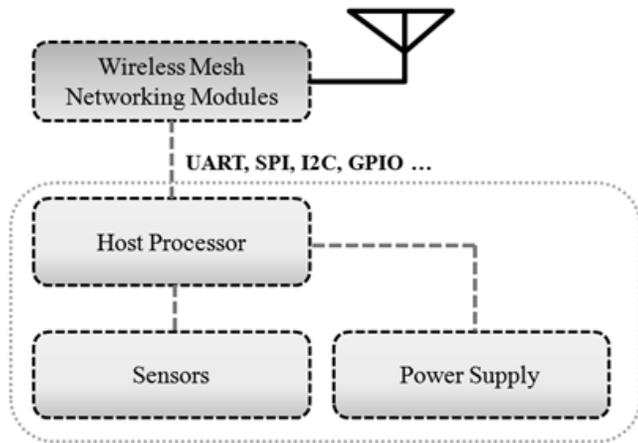


Fig. 2:- Typical sensor node in WMN

II. ENERGY CONSERVATION IN NETWORK LAYER

The different layers of the networks are responsible for configuration and data routing and it is generally self configuration network in different topology. Network layer choose the suitable mode for node and determine the most suitable neighbor node for data communication.

The dynamic adjustments for configuration has been done by routing protocols. But while configuring it will required maximum energy in a network.

Routing protocols are divided into three main types table driven as well as demand driven and hybrid routing (hrd) protocols where THDR protocol also called as proactive routing protocols.

In which each node maintain number of table which will have routing information just like updates of node

information energy information etc. Demand and route or demand driven routing is also called as reactive routing protocols.

Which will create routes just when its desired by the source node of the network[8]. When a node requires a route towards its destination node, it will take initiative route discovery process on the networks. But the combination of both the protocll is called as hybrid routing protocol. This protoging protocol combines the advantages of both protocol and recently it is one of the most popular method in wireless mesh network [9] network layer structure is given bellow,

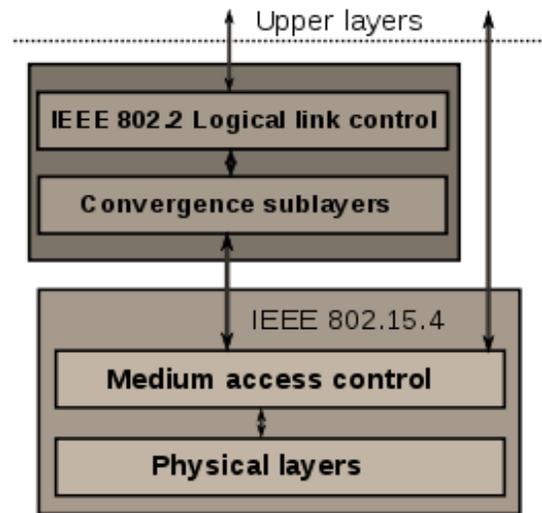


Fig 3:- WMN network layer

Wireless mesh networks share mainly common feature in ad hoc networks which will aproches the energy conservation Hence we make the comparative study survey for different aproches used in wireless mesh network which is given in a table bellow

Protocol	Network	Topology	contribution
CDS	Ad hoc	flat	Used information of neighborhood
SPAN	Ad hoc	Grid	As a co ordinate in transmission
GAF	Ad hoc	Grid	Knowledge of geographic positions
EMM_DSR	Ad hoc	Flat	Selection of short path
MER	Ad hoc	Flat	Node adjustment as per power level
Power aware	Ad hoc	Flat	Replenishment
Pulse	multihop	Tree	Fixed pulse interval
Green clustering	WLAN	Cluster	Central control to make a decision
Ca Det	WLAN	Cluster	Clustering and decision based tree
EAR	All networks	Flat	Engery consumption acount
ETR	WMN	Flat	Switching to node
Green Frame	WMN	Flat	Routing sheduling
CBRP	WMN	cluster	Minimized the flooding traffic

Table 1

➤ *Leach Protocol*

LEACH means the least energy efficient cluster head and A stands for adoptive, the number of nodes will get organized themselves into different clusters and remaining non-cluster head nodes will go to transmit the information to the cluster-head. The cluster head will perform aggregation of data and transmits the data to the base station which are placed in remote area. Hence cluster-head node is more energy intensive as compared to non-cluster head node.

When the set up phase starts for the nodes used in Leach protocol selection of the head depends upon how many times the head criteria are repeated and it will choose the random number between 0 and 1 if the number is found to be less as compared with threshold value then selection of head will get by following equation.

$$T(n) = \begin{cases} \frac{P}{1 - P(r \bmod \frac{1}{P})}, & \text{if } n \in G \\ 0, & \text{otherwise} \end{cases} \quad (1)$$

Where P indicates probability of cluster head desired, r will indicate current round and set of nodes denoted by G, that shouldn't CH in the last 1/P rounds. Once a node has been elected to be the cluster head it will broadcast an advertisement message (ADV). Each non cluster-head node decides its cluster for this round by choosing the cluster head that requires minimum communication energy, based on the received signal strength of the advertisement from each cluster head. After each node decides to which is in a particular cluster, it sends the message to the cluster head by sending a join request message and then back to the cluster head. TDMA will be set up by CH and schedule and transmits this schedule to the routing all the nodes in its cluster, completing the setup phase. Then it follows a steady-state operation. This steady state operation will get break into number of frames, in which nodes send their data to the ch at least per frame during their allocate

III. PROTOCOL ARCHITECTURE

In this architecture of protocol we are implementing three policies that is data tunneling second cluster head rotation policy and third, data aggregation for data to sleep mode cluster node.

➤ *Motivation For CH Role Rotation Policy*

A stochastic mechanism will select the CH in our LEACH protocol by checking threshold level. It will not consider energy consumption of a ch. Hence more energy dissipation by ch which will affect the reliability. Secondly, LEACH will go to assume that it may be every time a node becomes a CH, Generally CH is deployed at the maximum distance hence it required more energy for data tx and rx therefore this point has to be considered to improve the lifetime of the network.

➤ *Data Aggregation*

Generally in wireless sensor the deployed nodes are collecting the data from the environment and transfer it towards the cluster head. After sensing the data it will analyze and process the data for the mentioned application. In most of the cases data generated by the nodes will jointly forwarded towards the sink node hence data aggregation will be distributed. Which is going to explore the routing and processing method of the network. It will affect the packet delivery ratio in the established network. And efficiency as well as reliability of the network goes on decreasing. Hence we will go for the multihop technique which will overcome the problems and improve the lifetime of the network.

➤ *Data Tunneling for Sleep Mode Cluster Node*

As we seen earlier through many researchers WSN is divided into clusters for improved performance. Each and every cluster are going to perform the same kind of recording. It will not go to inform the base station but it should get informed time to time so that the formed cluster or network indicating that it is alive. And ultimately it will go to help to save the energy during sleeping mode. that is proactive networks. Network will keep themselves alive when some network data will be available. And this can be achieved by tunneling protocol.

IV. Hypothesis & Conclusion of survey

The work proposed by different researchers will be studied for performance & lifetime enhancement of WSN in WMN as well as practical application and their merits and drawbacks will be taken into consideration. It is planned to do the performance analysis and improve lifetime WMN with application wise. Data from standard database can be used for the proposed work if required. Any recommended standard platform will be used for simulation and/or code development. Any hardware and/or development kit if required will be used for implementation/development and/or testing the proposed work of fixed size (fixed geographic area). Areas are created such that any two nodes in any two

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