Improvement of Load Balancing in Distributed Architecture in WSN

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Abstract - *The rising Software defined networking (SDN) grants the partition of control plane and information plane and spares the resource consumption of the system. The new ideas have opened up another measurement to the plan of programming characterized strategy in Wireless sensor systems (WSNs). In any case, the limited routing methodology in software defined Wireless sensor systems imposes an excellent challenge in accomplishing the base traffic load. Here, we propose a methodology to find out the matter of traffic load reduction (TLM) in WSNs.*

Key Words: Topology, Acquisition, wireless sensor network, routing, flooding.

1. INTRODUCTION

The data gathered from wireless sensing element networks is typically saved within the sort of numerical data in an exceedingly central base station (Server). If a centralized design is employed in an exceedingly sensing element network and also the central node fails, then the complete network can collapse, but the dependability of the sensing element network will be increased by using distributed control architecture [7]. This architecture uses the concept of packet switching. This design incorporates a downside that there is also loads of tie up via nodes forwarding the packet towards the bottom station. It results in loads of propagation time and energy consumption throughout the propagation of knowledge. Many protocols were planned to ably use the optimum path to attenuate the propagation time and to increase the info rate of the wireless sensing element design. Once wireless sensing element design is deployed in disaster areas, polluted environments or high radiation region, battery recharge or replacement is impossible for human and wireless sensor architecture works until battery power of the complete sensing element node get die [8]. Hence the ability consumption by the poor planed routing algorithmic program has to be uninvolved. I would prefer to produce a plan which might achieve success during this variety of state of affairs. This will facilitate to transmit the info through wireless sensing element network whenever time management is that the primary goal. We would like to provide the thought for increasing the transmission rate.

2. DATA INTEGRATION AND SENSOR WEB

The information accumulated from wireless sensor networks is normally saved as numerical information in a central base station. Furthermore, the Open Geospatial Consortium (OGC) is determining norms for interoperability interfaces and metadata encodings that empower integration of heterogeneous sensor networks into the Internet, enabling any person to screen or control Wireless Sensor Networks through a Web Browser [4, 13]. Kamil Samara and Hossein Hosseini et al 2016 [1, 11], Directed diffusion is a well know routing algorithm for Wireless Sensor Networks (WSNs) that was planned in 2003.

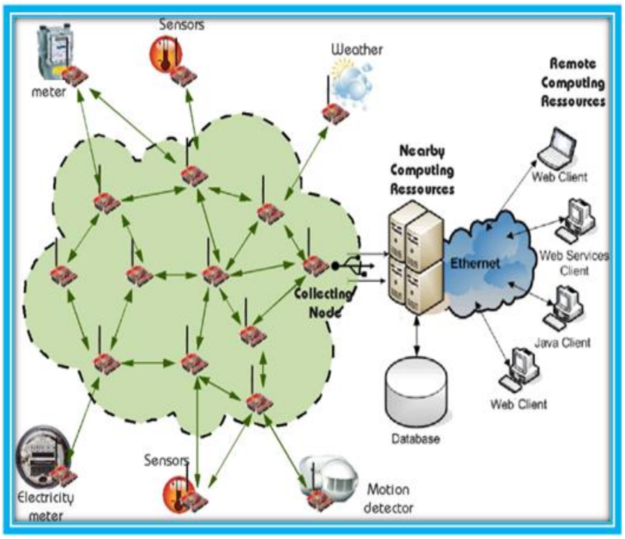

Fig.-1: Wireless Sensor Network design

Directed diffusion saves energy by sending information packets hop by hop and by enforcing paths to avoid flooding. The primary harm of Directed diffusion is that it doesn't know about the system and nodes status and subsequently can't compare potential paths to find the best or more advantageous path. As a push to attempt to beat this obstacle, we propose a network aware protocol. The proposed protocol gathers information about the accessible path and utilizations these information to implement more beneficial path utilizing machine learning [1, 4]. Yunxia Chen et al 2005 [2] derived a general equation for the lifetime of wireless sensor networks which holds autonomously of the hidden system model including system design and protocol, information gathering commencement, lifetime definition, channel fading characteristics, and energy consumption model [9]. This equation recognizes two key parameters at the physical layer that influence the system lifetime: the channel state and the residual energy of sensors. Subsequently, it gives not just a gauge for performance assessment of sensor organizes yet in addition a rule for the plan of network protocols [2]. Xukai Zouet et al 2017 [3], Routing (and forwarding) is a big issue in systems for conveying information starting with one node then onto the next. Today wireless networks are getting to be well known due to their "3 Anys"– Any individual, anyplace and anytime. Wireless ad hoc networks are named as mobile distributed multi hop wireless networks without predetermined topology (preexisting fixed infrastructure) or central control [7]. In this paper, we present a far reaching audit for routing highlights and methods in wireless ad hoc networks. For more than a dozen typical existing routing protocols, we compare their properties according to various criteria, and categorize them as according to their routing methodologies and relationships [6].

3. PROBLEM STATEMENT

The motivation to work in this research area is the Energy efficiency techniques which play a significant role in saving the energy. Usually a node becomes a cluster-head by a stochastic mechanism of tossing biased coins. Hence non cluster-head nodes belonging to the hot regions, which are expected to transmit frequently, dissipate more energy in transmitting data to a remote cluster-head located far [8, 10]. This leads to uneven energy dissipation over the network thereby reducing the network lifetime. Also it assumes that every time a node becomes a cluster-head, it dissipates an equal amount of energy. This is incorrect, as cluster-heads located far from the base station spend more energy in transmitting data than those nodes located near the base station [5, 12].

4. ANALYSIS

The aim is to improve the performance of the network by using the Probability theory. All the nodes are always at equal energy level, so that there is no need to measure all the nodes. The measurement may be done by any of the nodes. All the nodes will be dead almost simultaneously. It means the expected wasted energy level is almost zero. Hence the deployment may be done once.

5. PROPOSED WORK

As stated before, one of the approaches to save energy in the link layer is to switch the radio to sleep mode. To take advantage of this opportunity, the link layer requires a time-based medium sharing, e.g., TDMA. In heterogeneous networks the nodes have different capabilities. Nodes with high capability may be assigned more responsibility and overall energy consumption can be reduced by optimizing arrangements, while in homogenous sensor networks, all nodes are the same and the routing tasks are assigned equally among the nodes.

Here, we are introducing TDMA in homogeneous networks. This provides the desired Entropy due to homogeneous networks and TDMA provides the inactive nodes to be sleep. Now we distribute the equal load for all the nodes. With the help of MS Excel we have implemented the three traversal techniques but I have selected the post order or post fix traversal for routing. We have categories the levels (downward) for the child of any node and marked these levels by L1, L2, L3, L4,……….Lm, where m is the highest level of Tree depending on the network architecture.

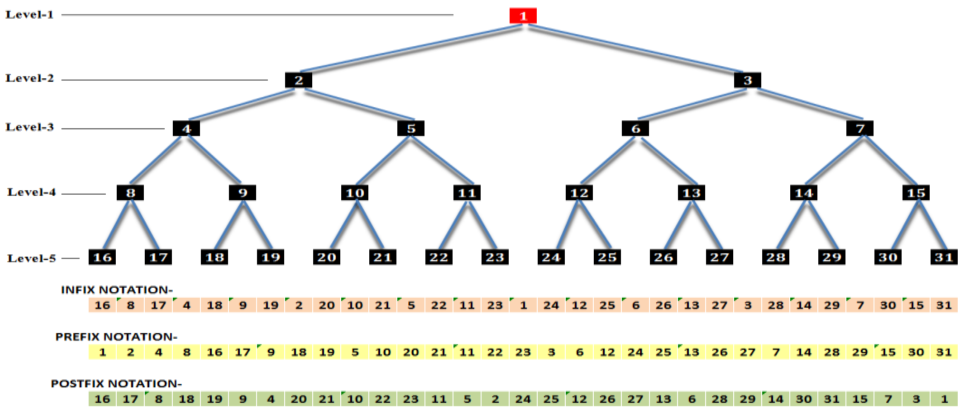

Fig.-2: Wireless Sensor Network Architecture

Let,

E_0 = Initial energy of the network = 10 J [14]

$E[E_w]$ = Expected wasted energy of the network (unused energy of network after the death of node)

= 10% of E_0 = 1 J [13, pn-63]

$E[E_r]$ = Expected reporting energy of the network

$$E[L] = \frac{S.E_0 - E[Ew]}{E[Er]} \quad \text{...} (1)$$

$$E[L] = \frac{25.\,10J - 1J}{3023\ mJ/60\ Sec}$$

E[L] = 4942 Sec.

consumed

by each of the sensors

= 2620 mJ/60 Sec to 3023 mJ/60 Sec [5, pn-7]

S = Total number of nodes in the network = 25

The Standard Deviation of power consumption is given by:

$Y = E[E_r]*S$

Y= [3023mJ/60 Sec] * 25

Y= 1.25

Now the average network lifetime is given by:

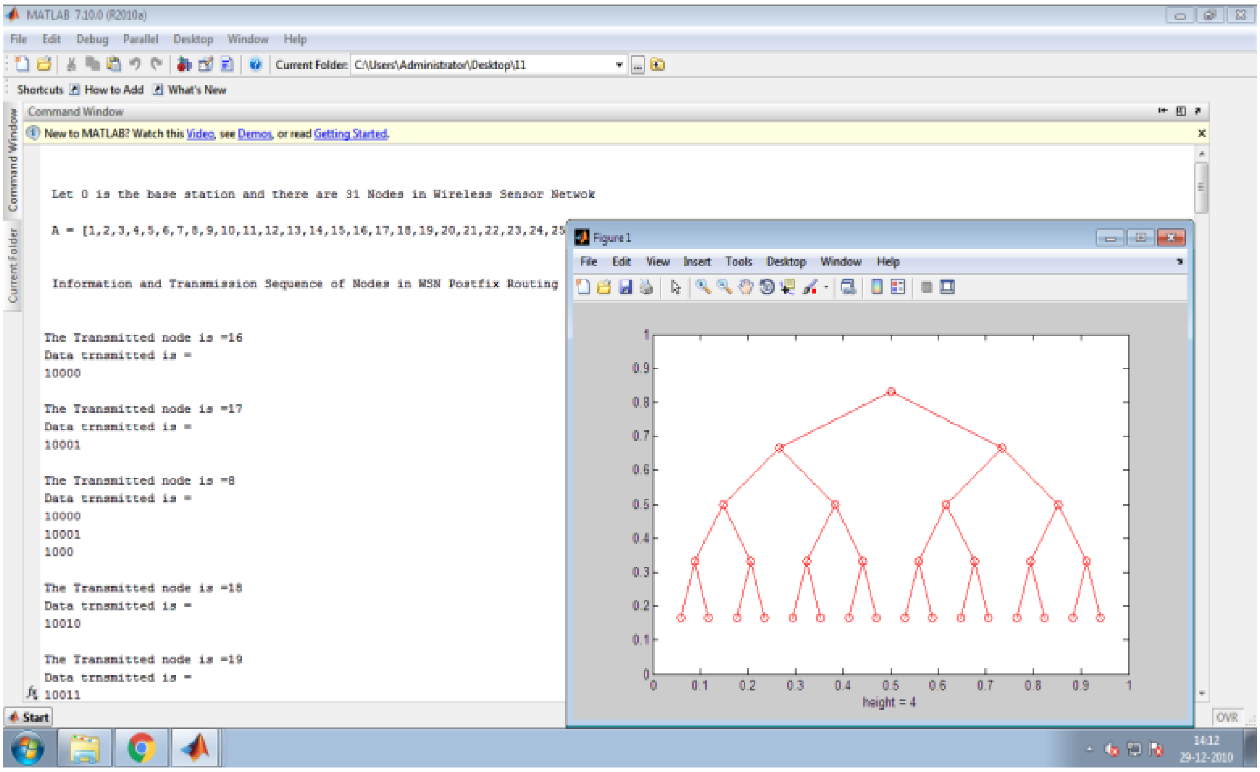

Fig.-3: Binary Tree Formation

6. RESULTS

The comparative results are comparison in between proposed procedure with the available procedures. The observe Results are given in table 1, 2 and 3.

Table 1: Entropy Calculation for non-uniform load distribution

Node	Probability of Load (PK)		log(Pk)	PK * log(Pk)
Node 1	P1	0 .25	1.999983085	0.499995771
Node 2	P2	0 .25	1.999983085	0.499995771
Node 3	P3	0.125	2.999974628	0.374996828
Node 4	P4	0.125	2.999974628	0.374996828
Node 5	P5	0.0625	3.99996617	0.249997886
Node 6	P6	0.0625	3.99996617	0.249997886
Node 7	P7	0.0625	3.99996617	0.249997886
Node 8	P8	0.0625	3.99996617	0.249997886
	TOTAL	**1**	H(X) = - PK * log(Pk) =	**2.749976742**

Table 2: Entropy Calculation for uniform load distribution

Node	Probability of Load (PK)		log(Pk)	PK * log(Pk)
Node 1	P1	0.125	2.99997	0.374996
Node 2	P2	0.125	2.99997	0.374996
Node 3	P3	0.125	2.99997	0.374996
Node 4	P4	0.125	2.99997	0.374996
Node 5	P5	0.125	2.99997	0.374996
Node 6	P6	0.125	2.99997	0.374996
Node 7	P7	0.125	2.99997	0.374996
Node 8	P8	0.125	2.99997	0.374996
	TOTAL	**1**	H(X) = - PK * log(Pk) =	**2.999974**