# MAXIMIZING NETWORK LIFETIME BY SINK RELOCATION IN WIRELESS SENSOR NETWORKS

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**Abstract**-*Wireless sensor network has many applications such as healthcare, weather forecasting, disaster management and so on. The WSN perform sensing and it will report the sensed data.Multihopping technique is used to report the sensed data's has important constraints as limited power resources. The node near to the sink which use more energy than other sensor node and it will decrease the network lifetime. Many techniques used for conserving battery power and increasing network lifetime but the efficient method is sink relocation. The sink relocation method for extend the network lifetime will not consume more energy for the sensor node. Energy aware sink relocation is done according to the residual battery energy of sensor nodes and it will adjust the transmission range of the sensor node then the relocation occurs.*

***Key Words: Sink relocation, Credit high, Credit low, WSN, Buffer overflow***

## 1. INTRODUCTION

A Wireless Sensor Network provides a low-cost and multifunctional means to link communications and computer networks to the physical world. WSN has base stations and a number of wireless sensors. Applications of WSNs are weather forecasting, defense, etc. WSNs has number of sensor nodes that will sense the environment and communicate to the sink node .Data processing and collection is done through the sensor. Sensor nodes will monitor the object and information will be transmitted to base station. Sensors organized into communication network. And sense the environment, process the data and then transmit information to sink node. The most important issues in WSNs is to preserve the limited battery resources of sensor nodes available in it. This paper concentrating about energy conservation and network lifetime enhancement .The network lifetime enhancement achieved through the conservation of battery power in sensor nodes. In WSN sensor nodes depleted in region cannot be recharged or replaced when power resource is drain. The battery drained out it occurs the communication problems.

## 2. RELATED WORKS

### 2.1. JOINT MOBILITY AND ROUTING STRATEGY:

Joint sink Mobility and Routing strategy (JMR) for data collection in a WSN. It uses a circular trajectory. The sink will use a constant velocity to circle the trajectory. .this schema mainly for data collection.

### 2.2. MULTIPLE MOBILESINK RELOCATION SCHEME:

Each trajectory has a mobile sink constantly relocation done in hexagon path. Sink passes through a sensor node, then the sensor can relay the sensed data to the mobile sink. This scheme is easy to implement and the sensor node can easily predict the sink's position because of moving velocity is constant and the trajectory is predetermined. The current residual battery energy id not considered in this scheme.

### 2.3. MOVING STRATEGY FOR MOBILE SINKS:

Mobile sink relocation scheme to drive the sink to the next position by taking the conditions of nearby nodes residual battery energy. The method firstly partitions the nearby sensing region of the sink into 8 fan shaped sectors. The sensor node with the maximum residual battery energy is called the Movedest .The sector containing the Movedest is called the Dest sector. If the residual battery energy of a sensor node is below a given threshold, then this node is called a quasi-Hotspot .A sector containing at least one quasi-Hotspot is called a miry sector otherwise, it is called a clean sector .The intersection point of current location of sink and the transmission range border. Then, based on the possible state (miry or clean) outcomes of the two neighboring sectors of the Dest sector, the new sink relocating position will be slightly minor adjusted accordingly.

### 2.4. MOVING SCHEMES FOR MOBILE SINKS IN WIRELESS SENSOR NETWORKS

Two autonomous sink movement schemes, the One-step and the Multi-step moving schemes.

1. One step scheme:

Compute the position of destination moving by total residual energy of sensor node. Moving destination is determined it will drive the sink to destination and it not consider the distance of the node.

2. Multistep moving schemes:

Sink collects the total residual battery energy from each sensor node with its communication range. Choose the sensor node with maximum residual energy for moving the destination. Set the intermediate moving destination to be the position of chosen node.

## 3. PROPOSED SYSTEM

In this method, the sink relocation technique the residual battery energy of the neighbor nodes battery energy goes low message relaying and environment sensing tasks. MCP Protocol used to decide the sink relocation for enhance network lifetime.

The proposed system consists of two parts:

1. The sink relocation mechanism
2. Power aware buffering

### 3.1SINK RELOCATION MECHANSIM:

It consists of two parts. The first is to determine relocation condition is met or not. The second part is to determine which direction and the relocation distance as well

The sink will periodically collect the residual battery energy then the collecting process is completed, sink use the MCP routing protocol to find the maximum capacity path P* with respect to each sensor neighbor u of sink s.
For each maximum capacity path P*, we denote the maximum capacity value with respect to P* as c(P*).
Let collection of sensor neighbors of s be N. Then relocation condition conditions occurs:
(1) when one of the capacity values c(P*) with respect to the sensor neighbor u in N drops below B/2; or
(2) The average residual battery energy of the neighbor set drops below B/2. When either condition occurs, which means the residual energy of the nearby sensor nodes of the sink become small or the residual energy bottleneck of some routing paths falls below a given threshold (B/2).

**Procedure –Energy Aware Sink Relocation (Sink S)**
**Input:**
V: set of sensor nodes;
N: neighbor set of S with range α;
B: Initial battery energy;
r (u): Current residual battery energy of u;
n (u): Neighbor subsets in a ring area;
k (u): Total residual battery energy of each node in n(u);
{
While (true)
{
/* data collecting */
Collecting the residual battery energy r(u);
Compute the maximum capacity path P* and its maximum capacity value c(P*);
/*summation of the residual energy of all the nodes within the ring area*/
k (u)= ∑r(u);
/* relocating condition checking */
Compares the k (u) of each ring in the network;
if(k(u)<B/2)
Then
/* perform the sink relocating */
Determine the moving destination candidate position S1, S2, S3 and S4;
Compute the neighbor subset N1, N2, N3 and N4;
Compute the weight value wi with respect to each neighbor subset Ni ( 1 ≤ I ≤ 4);
Let Si be the moving destination candidate with the maximum m weight value among
w1, w2, w3 and w4;
Relocate the sink S to the position Si;
}
}//end while (true) loop
}

### 3.2POWER AWARE BUFFERING

Two ways data loss occurred in wireless communication.

- Data lost is occur on transmission on the communication channel because of channel impairment, no connecting nodes.
- Data loss is before data transmission takes place. When hardware size is small then memory space is low then buffer will be overflow then data will be lost.

Data lost before getting transmitted. It occurs due to the buffer overflow at the output buffer. Sensor node with limited buffer capability, the transmission of data message a from the source node to the destination node leads buffer overflow because of traffic load. The advantage of power aware buffering leads to take advantage of the predictable idleness of workload and extend the lifetime of sensor networks.

In our proposed algorithm, in each node buffer level will be monitored by the credit level stored in the sensor node itself. If the buffer level is above a threshold value the credit will be updated as low else it will remain as high

**Procedure- power aware Buffering with Credit technique**
**Input:**
CH: Credit High indicates the more buffer level in the sensor nodes;
CL: Credit Low indicates the less buffer level in the sensor nodes;

q_level: variable that holds either CH or CL;
{
/* Monitors the q_level */
determines the buffer level and embeds the q_level (CH/CL) with the hello message;
broadcasts the hello message for interval of time;
if (q_level==CH)
{
The nodes find an alternative path;
}
Else
{
Forwards the data in the existing path
}

In this algorithm, the buffer level shared by hello message will be generated for periodic interval of time to update the other node's residual energy. The hello message in the network next hop and the queue level. The node has enough buffering capacity updated as credit high (CH).The node has less buffering capacity updated as low. The node is credited as high then node is forwarded else credit is low then find the alternate path. .By monitoring the buffer level packet loss reduce and throughput latency= is increased.

## 4. SIMULATION AND RESULT

Relocatable sink is approach for enhance network lifetime this approach will not harm the network lifetime. Information lost is occurred due to buffer overflow. This paper concentrate buffer over flow problem then packet loss is reduced then energy is also preserved in node.

### 4.1Packet delivery ratio:

The ratio of the packets that are successfully delivered to a destination compared to the number of packets that have been sent out by the sender.

$$Pdr=\frac{number\ of\ packets\ received}{number\ of\ packets\ sent}$$

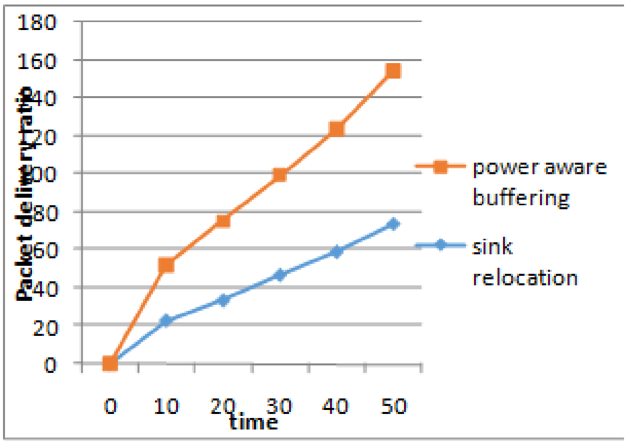


**Figure-1:** Packet delivery ratio

The figure 1 depicts the packet delivery ratio of the system. As compared with the number of nodes in x-axis and PDR in y-axis it is proved that ratio has been increased with the use of algorithm.

### 4.2Throughput:

The throughput is a measure of units of information a system can process in a given amount time. Here it is calculated using time and the number of received packets.

$$Throughput = \frac{received\ packet\ size}{time}$$

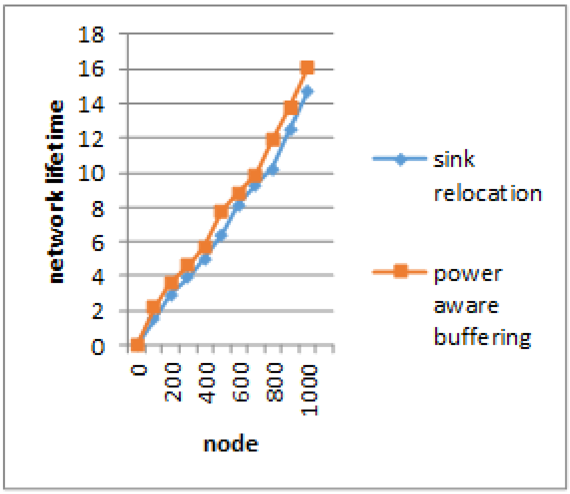


**Figure -2**: Throughput

The above figure is to show the throughput variance between existing and proposed system. While it is compared the proposed system with power aware buffering has higher throughput than the existing system which shows it is much better in performance.

### 4.3End to End delay:

It refers to the time taken for a packet to be transmitted across a network from source to destination. It also includes delay caused by route discovery process and the queue in data packet transmission. Only the data packets that successfully delivered to destinations that counted.

$$End\ to\ End\ delay = \frac{\sum_i^n (CBR\ sent\ time - CBR\ received\ time)}{\sum_i^n CBR\ received\ time}$$

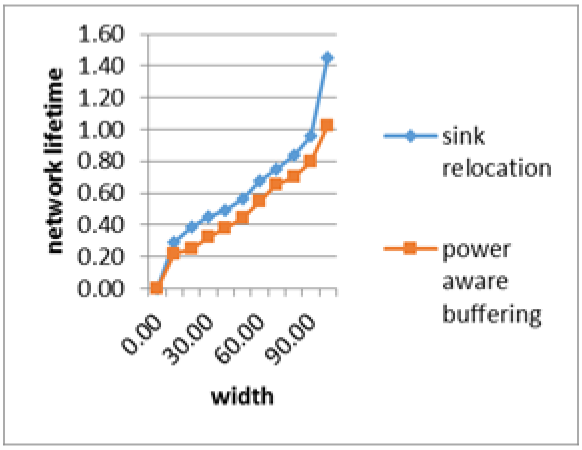


Figure3: End to End delay

The above figure 3 depicts the end to end delay comparison. As the number of nodes increases the delay is decreased in the proposed system.

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