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# Energy Efficient Optimization of SDN using MAC Protocol

**M. Rajalakshmi[1], V. Suvedha[2], S. Sultana Farveen[2]**
[1]UG student, [2]Assistant Professor
Department of Electronics and Communication Engineering, RAAK College of Engineering and Technology, Pondicherry, India

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## ABSTRACT

In this paper, MAC protocol designed for Wireless Senor Networks. Wireless Sensor Networks use battery operated computing and sensing devices. Despite extensive research efforts, Underwater Sensor Networks (UWSNs) still suffer from serious performance issues due to their inefficient and uncoordinated channel access and resource management. A centralized energy-aware routing scheme in an SDN-enabled UWSN is evaluated Existing results identified that the protocol overhead due to the simultaneous transmission over interference-prone links and the hidden and exposed terminal problems are the main cause of worse performance for existing decentralized routing protocols. Using the adaptation of the SDN technology, can avoid such detrimental phenomenon, which results in remarkable performance improvement for the entire network.

**Keywords:** Software Defined Network (SDN), Underwater Sensor Network (UWSN), Reliability, Energy efficiency, latency.

## I. INTRODUCTION

Software-Defined Networking (SDN) is a network architecture approach that enables the network to be intelligently and centrally controlled or 'programmed,' using software applications. This helps operators manage the entire network consistently and holistically, regardless of the underlying network technology. The rapid increase of mobile data growth and the use of smart phones are creating unprecedented challenges for wireless service providers to overcome a global bandwidth shortage.

A WSN is a network of many small computing nodes. These nodes are equipped with sensors and communicate wirelessly, using radio frequency transmission. The aim of this network is to measure and record the physical environment and to communicate together. Using a multihop communication, it allows the measured data to be forwarded over a long distance to the main location which is known as a sink. To reduce the energy consumption in WSN requires optimization across all layers.

The medium access control (MAC) layer is a part of the data link layer which plays one of the most crucial roles in the communication protocol's overall energy efficiency. The establishment of a reliable and efficient communication link between WSN nodes is imperative. As the nodes are equipped with resources and power, the following characteristics for WSN MAC Protocol should be considered as listed. To design a new MAC protocol and to prove that it performs well, the experiments with different WSN scenarios are necessary. The aim of our work is to create a modified MAC protocol in WSN which could overcome the disadvantages of existing protocols in relation to energy efficiency, reliability, low access delay and high throughput. Further aspects such as security, mobility and real-time usage are also important but not the essential aspects in this paper.

## II. SOFTWARE DESCRIPTION

### A. MAC PROTOCOL

Medium Access Control (MAC) is an important technique that ensures the successful operation of WSN because it controls the radio's activity of sensor nodes, which consumes node's major energy. MAC protocols must be energy efficient in wireless sensor networks. It enforces a methodology to allow multiple devices access to a shared media network. MAC Protocol is the first layer above the physical layer in ad hoc. MAC protocol tries to avoid collisions by not allowing two interfering nodes to transmit at the same time. The main design goal of a typical MAC protocols is to provide high throughput. On the other hand, wireless sensor MAC protocol gives higher priority to minimize energy consumption.

### B. DIJKSTRA'S ALGORITHM

Dijkstra's algorithm (Dijkstra's Shortest Path First algorithm, SPF algorithm) is an algorithm for finding the shortest paths between nodes in a graph, which may represent, for example, road networks. It was conceived by computer scientist Edsger W. Dijkstra in 1956 and published three years later. The algorithm exists in many variants. Dijkstra's original algorithm found the shortest path between two given nodes, but a more common variant fixes a single node as the "source" node and finds shortest paths from the source to all other nodes in the graph, producing a shortest-path tree.

It can also be used for finding the shortest paths from a single node to a single destination node by stopping the algorithm once the shortest path to the destination node has been determined. For example, if the nodes of the graph represent cities and edge path costs represent driving distances between pairs of cities connected by a direct road (for simplicity, ignore red lights, stop signs, toll roads and other obstructions), Dijkstra's algorithm can be used to find the shortest route between one city and all other cities.

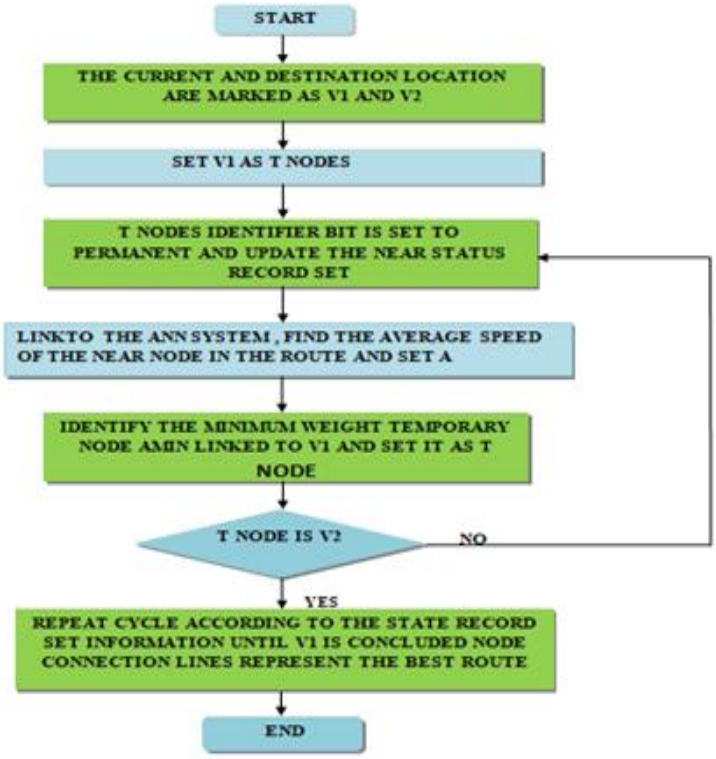


**Fig 1: Flow chart for Dijkstra Algorithm**

### C. MATLAB

MATLAB is a high-performance language for technical computing. It integrates computation, visualization and programming in an easy-to-use environment where problems and solutions are expressed in familiar mathematical notation. Typical uses include: Math and computation. It is an interactive system whose basic data element is an array that does not require dimensioning. This allows you to solve many technical computing problems, especially those with matrix and vector formulations, in a fraction of the time it would take to write a program in a scalar non interactive language such as C or FORTRAN. This is a high-level matrix/array language with control flow statements, functions and data structures, input/output and object-oriented programming features. It allows both "programming in the small" to rapidly create quick and dirty throw-away programs and "programming in the large" to create complete large and complex application programs.

## III. MODULE DESCRIPTION

**Module 1: Design of wireless sensor networks**

This module contains the creation of nodes randomly in the free space, allocating the energy and distance cost for the nodes. Finding the cluster head on different environment will be the next task.

**Module 2: Communication Establishment**

Once the nodes are aligned and created, the next job is to establish the connection in the networks; the established nodes are connected with the shortest distance of the nodes. After that, the cluster tries to find out the Blockage in the path.

### Module 3: Dynamic off-loading

This module consists of Mac protocol to evaluate the roots. the system also evaluated dynamic backhaul support model in which the data loss should be reduced, Dynamic off-loading of data which is going to be missed in the route based on Energy Efficiency that avoid Data loss effectively.

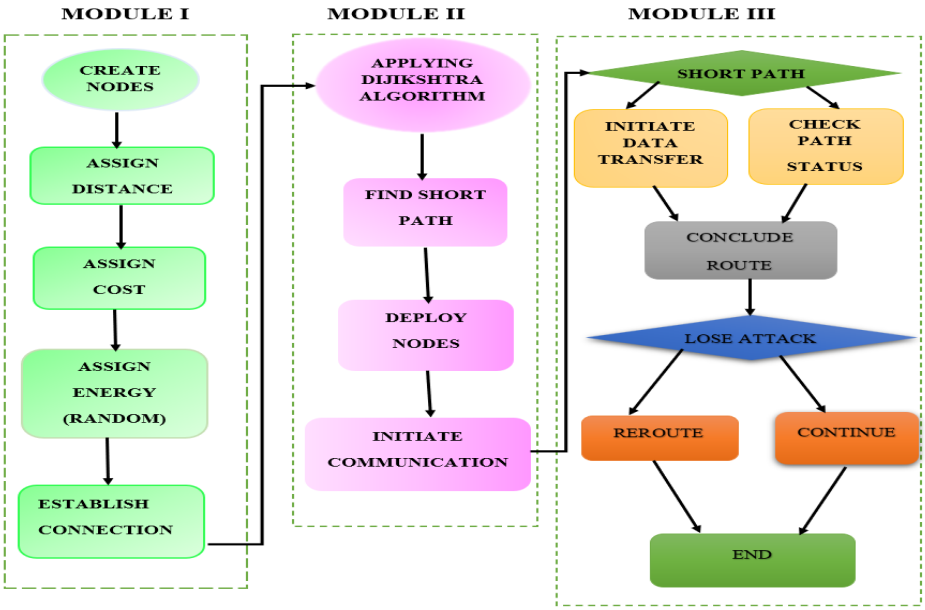


Fig 2: Data Flow for Nodes Deployment

## IV. PROPOSED METHOD

In this proposed system, Development of MAC protocol with Energy efficient backhaul dynamic support system is focused. The system works with considering the dynamic updating of the network with data offloading. Data save through cluster heads in case of energy loss. Evaluate the shortest routing model every iteration to reduce routing overhead. Alert the system when routing problem occurs. In the system the nodes are created for the data transmission. Then configure distance, cost and energy efficiency on each node.

The random data for transmission in the network are created as packets. Based on above configuration the connection is established. The shortest path of data transmission through WSN can be identified using shortest path algorithm (Dijkstra shortest path search). Based on the shortest path algorithm the path is identified and data transmitted. The nodes deployed in the field for energy efficient. The nodes are connected, two or more nodes made a cluster and it elects the cluster head of each cluster based on two criteria: the distance to the cluster centroid and the residual energy of nodes. Cluster head as called as Pan co-ordinator.

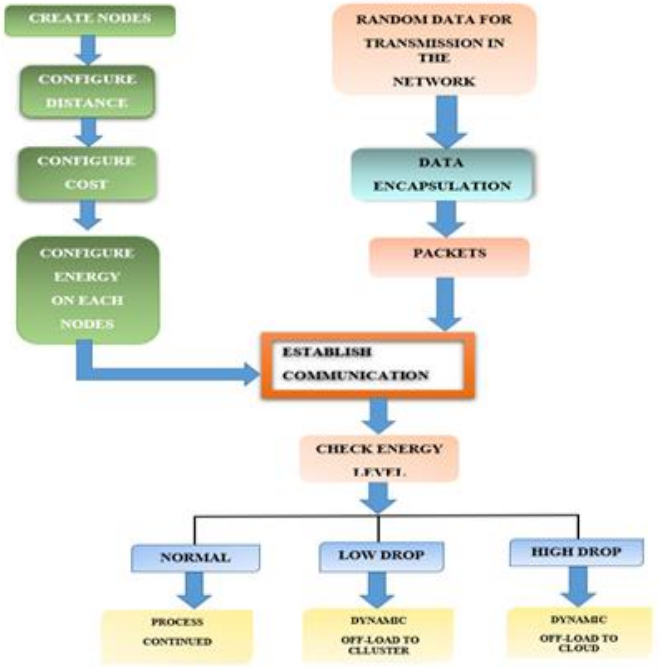


**Fig 3: Block diagram of Energy Level**

The main aim is to find the energy level of data transmission. If the energy level is normal then the process of data transmission is continued the system also evaluated dynamic backhaul support model in which the data loss should be reduced, Dynamic off-loading of data which is going to be missed in the route based on Energy Efficiency that avoid Data loss effectively.

## V. RESULTS & DISCUSSIONS

The Fig.4 show that the nodes deployed in the field for energy efficient. The nodes are connected, two or more nodes made a cluster and it elects the cluster head of each cluster based on two criteria: the distance to the cluster centroid and the residual energy of nodes. Cluster head as called as Pan co-ordinator.

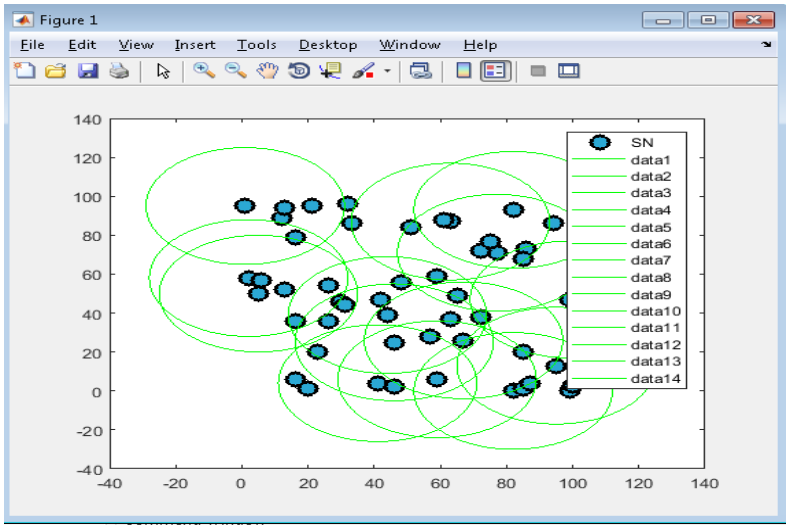


**Fig 4: Nodes deployment for energy efficient**

The Fig.5 shows that to applying dijkstra algorithm to find the shortest path for data transmitting with low energy consumption. This algorithm is used to find nearby node to transfer the data.

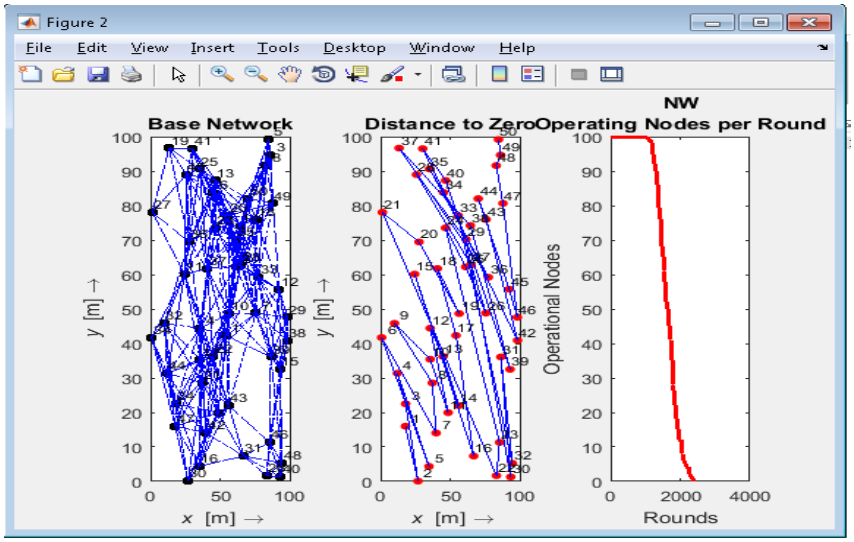


**Fig 5: Dijkstra shortest path search**

The Fig 6: shows final operational path for shortest route after solving the shortest path algorithm.

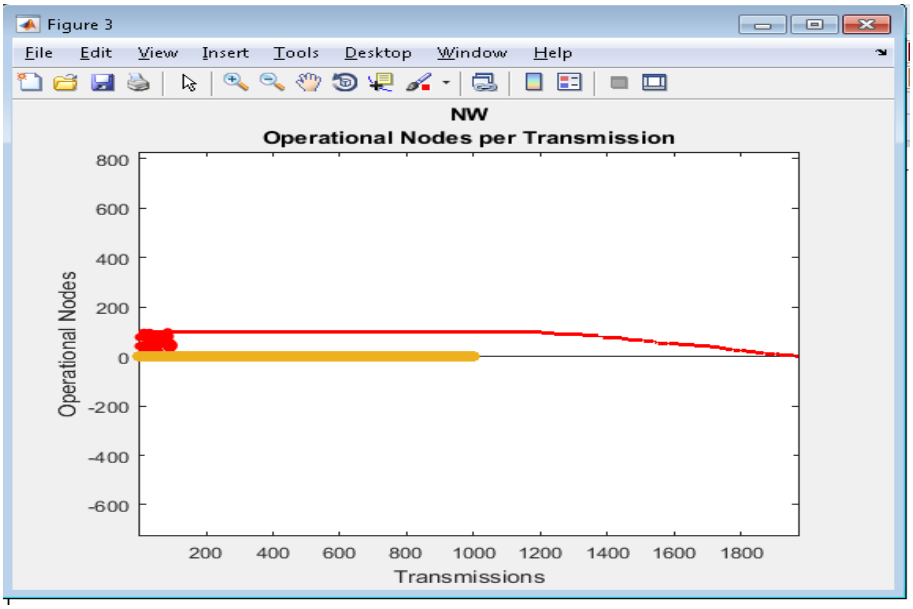


**Fig 6: Final operational path for shortest route**

## VI. CONCLUSION

With growing demand in high data speed and increase in number of subscriber which is estimated to increase by 30% in the year 2020.So, the present technology like 3G, 4G cannot support this hence there is a requirement of developing next generation mobile network which is to be called 5G network. The proposed system focused on spatial correlation-based line of sight problem would be solved. The proposed system uses dijkshtra for shortest path search algorithm. The proposed framework uses adjustable routing model through spatial correlation technique during data loss because of line of sight problem. The result shows the proposed rerouting consumes less delay and the propagation of data packets would be altered.

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