A Path Weight Based routing Over Wireless Mesh Networks

Ankush Sharma
Assistant Professor, Dept. Of C.S.E,
Chandigarh University Gharuan, India

Anuj Gupta
Head, Department of Computer Science Engineering,
RIMT IET, Punjab, India

Abstract – sA Wireless Mesh Network (WMN) is a mesh network made up of radio nodes installed at each network user location. Each network user provides data to the next node. The main objective of the paper is to firstly source will send the data to the node by detecting the highest throughput of the node and distance combined among all. Data from node to node is transmitted by keeping a check on the distance and throughput until the data is received by the sink (destination).

Keywords: Wireless mesh network, DVR, routing protocol, routing metrics.

I. INTRODUCTION

Wireless mesh networks (WMNs) consist of nodes that make an ad hoc network and maintain the mesh connectivity. WMNs consist of two types of nodes: mesh clients and mesh routers. WMNs has router that consist of routing function. A mesh router covers the same area with less transmission power using hop method. Mesh router is usually combined with multiple wireless interfaces to improve the flexibility. Hardware platform is similar in Mesh and wireless routers.

Mesh routers and mesh clients are known as mesh nodes which act as the backbone for the network. Configuration of nodes is done automatically and dynamically. Characteristics of mesh network are self-forming and self-healing so there is no need for centralized management. Mesh routers are stationary. End users can connect to these routers, which act as backbone. All wireless network use multihop routing technique

One of the advantages of wireless sensor networks is their ability to operate unattended in harsh environment in which manually human monitoring schemes are inefficient and risky. Communication efficiency depends on the distance between communicating nodes.

In short distance and efficiency are inversely proportional to one another i.e. if distance is large then it will consume a large amount of energy and thus efficiency decreases and vice versa.

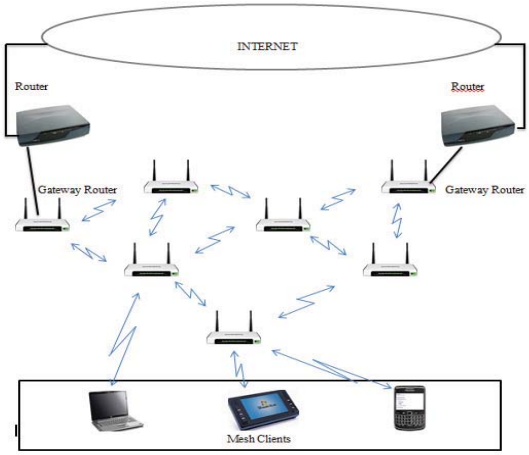

Fig. 1. Wireless mesh backbone structure [3]

Routing metrics are very important for calculating the best quality path. Routing is performed in each and every relay node so as to find the next hop for the packet. Due to interference between the links the designing of routing metrics is very difficult. Interference occur both in single channel and multi channel. In a multi-channel wireless network, interference exists when two transmissions interfere with each other if they are using the same channel Routing has significant impact on overall network's performance as it can enhance the capability of communication system [5].

A. *Quality Of Service*

QoS routing in multihop wireless networks is very challenging due to interference among different transmissions. Even in a multi channel wireless network, interference still exists since two transmissions may interfere with each other if they are using the same channel. A QoS connection request usually comes with a bandwidth requirement and QoS routing seeks a source to destination route with requested bandwidth. The notion of QoS, is a guarantee by the network to satisfy a set of predetermined service performance constraints for the user in terms of the end-to-end delay statistics, available bandwidth, probability of packet loss, and so on.

B. *Routing*

Routing means how to, whom to, when to transfer the packet in any communication network for transmission of data. In short words routing is to find the most optimum path for transmission among all. Few of them were based on energy consumption.

C. *Distance Vector Routing*

Distance-vector routing protocol requires that a router informs its neighbors of topology changes periodically. Compared to link-state protocols, which require a router to inform all the nodes in a network of topology changes, distance-vector routing protocols have less computational complexity and message overhead. The term distance vector refers to the fact that the protocol manipulates vectors of distances to other nodes in the network.

II. PROPOSED SYSTEM

In proposed system firstly source will send the data to the node by detecting the highest throughput of the node and distance combined among all.
To overcome these upcoming problems/issues determine the distance and throughput of the nodes. Now what path has to be followed for accurate /healthy communication is detected. Shortest way to select is determining the throughput of various nodes.

After transmitting data to it again note the various factors as distance and throughput of nodes and repeat the process till data reach the destination. An acknowledgment is provided back to the transmitting node as the information regarding whether data is received properly or is lost.

As communication starts and data is send. A coverage area is defined and then the nodes distance is checked, for example if there lays three nodes which are very close to the source. Then proposed algorithm will pick the value on the basis of bandwidth/ throughput of all three nodes.

Node with the highest throughput is selected to carry out the communication.

The node which has receive the data, now for further communication will act as source and will transmit the data onwards. Now again the throughput is calculated. Data from node to node is transmitted by keeping a check on the distance and throughput until the data is received by the sink (destination).

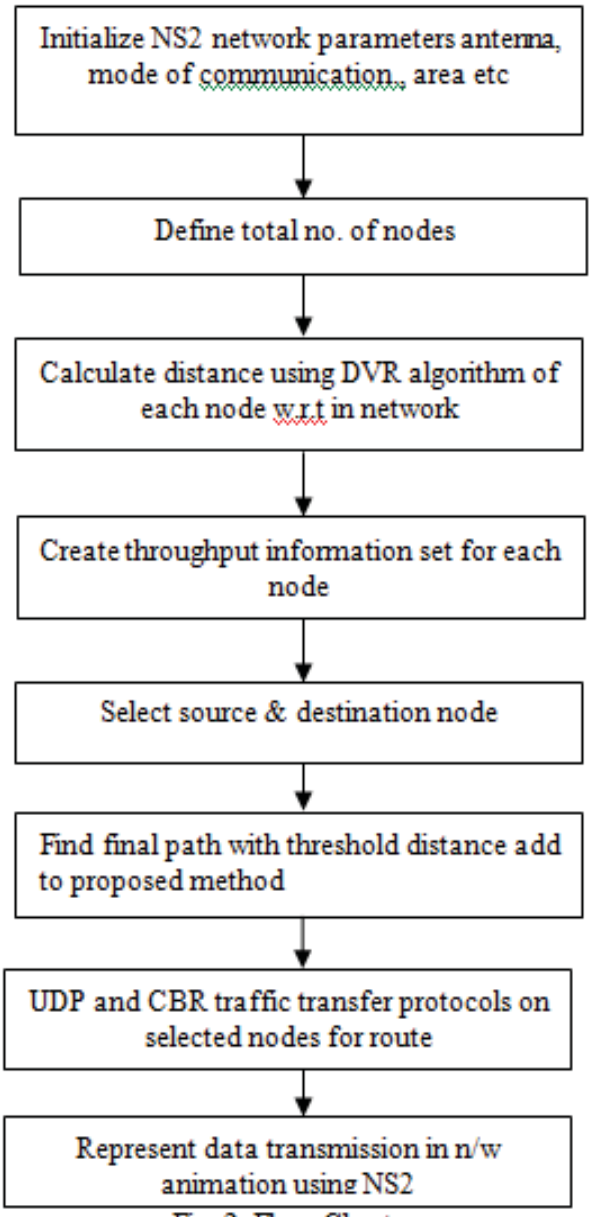

Fig. 2. Flow Chart

III. PROPOSED ALGORITHM STEPS

1. First step is to initialize all the parameters of the network such as antenna, coverage area, mode of communication etc
2. Now determine total numbers of nodes and define them.
3. To find the efficient path of transmission follow as explained:
4. Next step is to determine the distances between the nodes which is performed using Distance Vector Routing algorithm in full network.
5. Here we need to get a check on the throughput of the each and every node and prepare a set of database only containing the throughput.
6. Among the total numbers of nodes select source and destination node.
7. Finally find the exact path of transmission with following of threshold distance and the proposed methodology as explained earlier.
8. Use UDP and CBR traffic transfer protocols on selected nodes for route of transmission
9. As we get the most efficient path of transmission from source to sink node through various nodes selected using distance and throughput, just represent the data transmission in network animation using NS2.

IV. REPRESENTATION OF PROPOSED SYSTEM THROUGH FIGURES

A. Figure representing total number of nodes

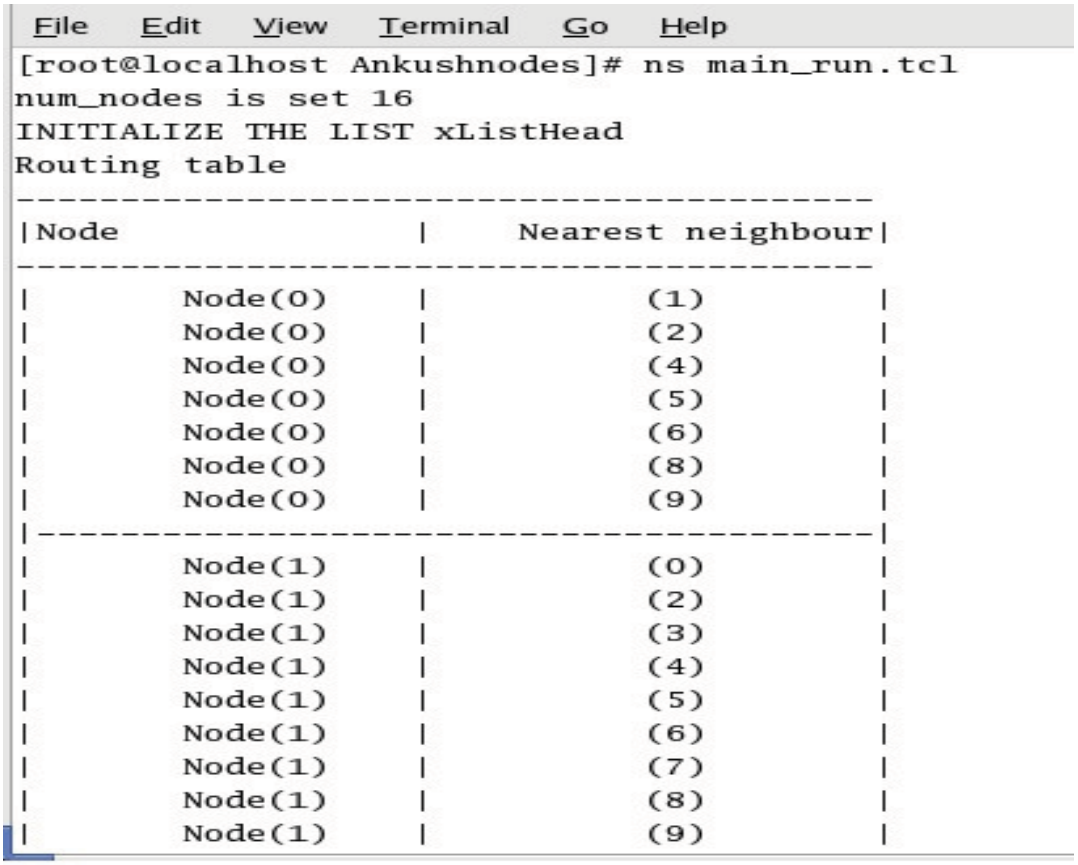

Fig. 3. Total number of nodes

B. Creating Throughput information set for each node

ThroughPut Manager

Node	ThroughPut
Node(0)	2
Node(1)	2
Node(2)	2
Node(3)	2
Node(4)	2
Node(5)	1
Node(6)	2
Node(7)	2
Node(8)	1
Node(9)	2
Node(10)	1
Node(11)	1
Node(12)	1
Node(13)	2
Node(14)	2
Node(15)	2

Fig 4. Throughput information set

C. Selection of Source and Destination nodes

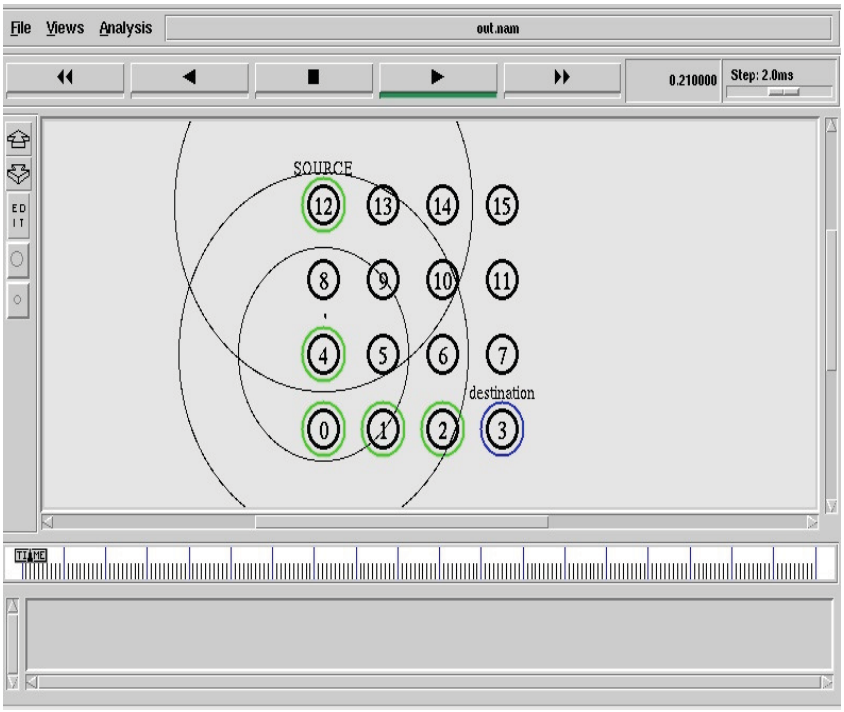

Fig. 5. Source and Destination nodes

V. SIMULATION TOOL(NS2)

ns is an object oriented simulator, written in C++, with an OTcl interpreter as a frontend. The simulator supports a class hierarchy in C++ (also called the compiled hierarchy in this document), and a similar class hierarchy within the OTcl interpreter (also called the interpreted hierarchy in this document). The two hierarchies are closely related to each other; from the user's perspective, there is a one-to-one correspondence between a class in the interpreted hierarchy and one in the compiled hierarchy. The root of this hierarchy is the class Tcl Object. Users create new simulator objects through the interpreter; these objects are instantiated within the interpreter, and are closely mirrored by a corresponding object in the compiled hierarchy. The interpreted class hierarchy is automatically established through methods defined in the class Tcl Class. User instantiated objects are mirrored through methods defined in the class Tcl Object. There are other hierarchies in the C++ code and OTcl scripts; these other hierarchies are not mirrored in the manner of Tcl Object.

VI. RESULTS

By using this approach delay gets reduced in the transmission of data. It provides efficient and faster network for data transmission.

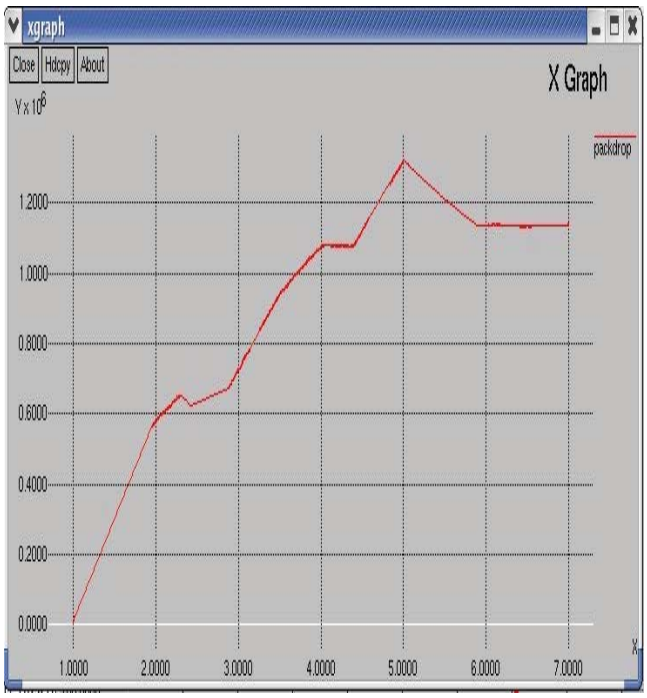

Fig. 6 Reduction Of Delay

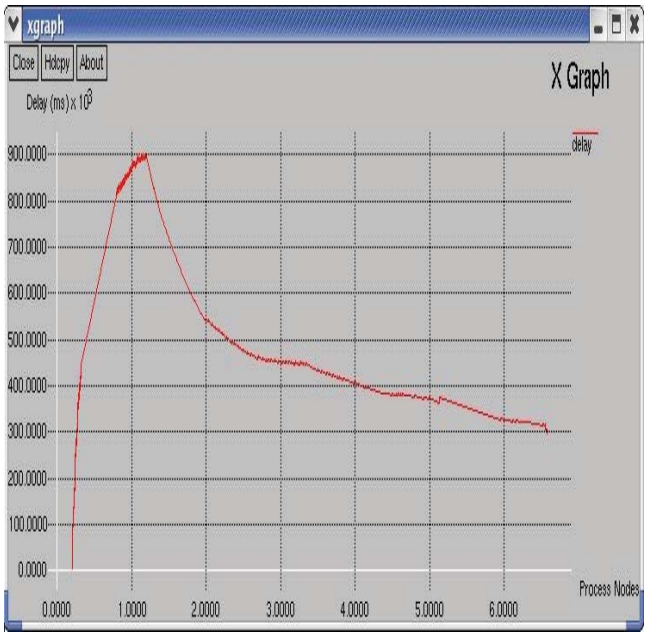

Fig. 7 Increase in Efficiency

VII. CONCLUSION

This paper represents a new approach in keeping the distance concept constant with an introduction of throughput of nodes. This leads to reduce the delays in the transmission of data with a hand increment in the efficiency of the network. This provides a network which is faster than earlier proposed energy and distance approaches.

.

VIII. ACKNOWLEDGMENT

The success of this Paper would have been uncertain without the help and guidance of dedicated person. Thus as a token of appreciation of their effort in making it a success, With a deep sense of gratitude I would like to extend thanks to Mr. Anuj Gupta for their kind cooperation in the preparation of this Paper. Last but not the least; we would like to convey our heartfelt gratitude to our beloved parents, without their constant inspiration throughout our career we would not have reached this stage.

REFERENCES

[1] Mohammad Siraj, "A Survey on Routing Algorithms and Routing Metrics for Wireless Mesh Networks", in World Applied Sciences Journal 30 (7): pp. 870-886, 2014.

[2] Nxumalo1,2, M.O. Adigun1, P. Mudali1,2, N. Ntlatlapa2, S.M. Ncanana1, "Comparison of Routing Metrics for Wireless Mesh Networks", In Research Space 2011.

[3] Jobin S Thomas, Noufidali V M,Felix Arokya Jose, "A Survey on Bandwidth Guaranteed Routing Techniques in Wireless Mesh Networks", International Journal of Computer Applications (0975 – 8887) Volume 60– No.5, December 2012.

[4] Yaling Yang, Jun Wang and Robin Kravets, "Interference-aware Load Balancing for Multihop Wireless Networks", in IDEALS 2005.

[5] Ankush Sharma, Anuj Gupta, "A Survey on Path Weight Based routing Over Wireless Mesh Networks", in International Journal of Innovations in Engineering and Technology (IJIET), Vol. 3 Issue 4 April 2014.