Shikha Choudhary *et al*, International Journal of Computer Science and Mobile Applications,
Vol.6 Issue. 2, February- 2018, pg. 71-76 **ISSN: 2321-8363**
Impact Factor: 5.515

PARTIAL MESH BASED DYNAMIC ROUTING WITH FAST CONVERGENCE FOR WMN

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ABSTRACT- The mesh networks are the robust connectivity based network structures, which offers the inter-connectivity and flexibility for the users roaming across the different types of networks. For example the cellular networks of type 2G, 3G and 4G are when roamed around by users, the connectivity is provided in every individual cell irrespective of the different connectivity standards. The mesh networks offers the higher order flexibility in the service oriented network communications (SONC), where the service-first on independent network infrastructures. In this paper, the robust routing mechanism has been proposed for the mesh networks for the quick convergence with smart network path updation. The new mechanism works on the basis of continuous monitoring of the target network link for the moving nodes in the wireless zones. The quick convergence based false routing mechanism is offered by using the link state routing with partial mesh sparse matrix. The performance of the proposed model has been evaluated in the form of number of aggregator nodes and energy consumption.

Keywords: Mesh routing, WMN, Partial Mesh Networks, Dynamic Routing.

1. INTRODUCTION

Currently, instability is managed by applying thresholds to those metrics used. This dictates that a sensor will only change parent to a competing neighbour, if the competing neighbor advertises a metric that is better than the current parent by a predetermined amount. This amount is carefully chosen as it poses a trade-off between stability and dynamism in the network; two aspects we wish to maintain in the network. This solution is easy to implement but relies solely on a single threshold and therefore does not constitute a complete solution. Neighboring node and its connection is unique as it aims to increase stability by asserting proactive damage control by routing through sensors offering good failover options. Route changes are inevitable, but if a used link goes down unexpectedly, another similar route is more likely to be available to carry traffic minimizing the knock-on effect of the change preserving stability. The new alternative route computation in the proposed model would be done by using fast path convergence based data propagation (PADP). The proposed solution is intended to improve the routing methods by removing the connectivity loopholes and increasing the throughput of the wireless network.

2. LITERATURE REVIEW

Young-Chul Shim, et al. (2011) introduced Geocast different algorithms using information about neighboring hop-hop. In this comparison of their performance by using simulation is done and identify the algorithm. Each algorithm uses two-hop neighbor knowledge and attempts to reduce the pitch. Long Cheng et al. (2012) proposed the location without based wireless sensor network techniques. The location estimation methods can be classified into target / source localization and self-location node. In the target location, the author mainly introduces techniques based energy. Sinha et al. (2012) wireless sensor nodes can be deployed on a battlefield and organized in an ad-hoc network on a large scale. Traditional routing protocols do not take into account that a node contains only a limited amount of energy. Geon et.al (2013) wireless sensor network consists of hundreds of thousands of sensor nodes collect various data, such as temperature, sound, location, etc. They have been applied in many fields such as health, the surveillance system, the military, and so on. It is generally difficult to recharge or replace the sensor nodes that have limited battery capacity. Si, Weisheng et. al. (2014) has proposed the geometric deployment and routing scheme for directional wireless mesh networks. This paper first envisions the advent of the directional wireless mesh networks with multiple radios and directional antennas in the coming years.

3. EXPERIMENTAL DESIGN

The optimal path selection model plays the important role in the case of proposed model, specifically designed for the mesh network. In the simulation, there are total 120 number of nodes has been aggregated for the inter-connectivity and backbone construction. The proposed model works in the layered architecture, where the proposed model is based upon the optimal path selection model, which has been described in the following algorithm:

Algorithm 1: Mesh Network Routing Algorithm

(1) Power up the mesh network nodes
(2) Performance the initial connectivity mechanism within in the given transmission radius
(3) Enable the networking module on the mesh networks
(4) If the networking module is found active and working
- *Register the network agent and start the procedure of layer-3 connectivity*

(5) Otherwise the network agent is terminated and the node is withdrawn from the simulation due to software failure
(6) If 4(1) is found correct, the do the following steps:
 a) Find the nodes with the connectivity failures and eliminate them from the simulation
 b) In case the queue of the node responds as "full stack", do not source the node in the simulation
 c) Send the echo packets towards the target nodes
 d) If echo reply is received successfully, then the connectivity can be initialized.

(7) If step 6 responds with the true value on all of the verification steps
 a) Connect the nodes and update the connectivity tables
 [cData timeConsumption] = f(x) {nodeDat (xi), X-cord, Y-cord };
 Where cData find the nodes in the list, timeConsumption shows the total transmission delay, nodeDat (xi) shows the current node id and X & Y shows the coordinates of the nodes.

(8) If step 7 returns true for connectivity,
- *Register the route and update the network data*

(9) Otherwise
- *Respond with "no path" message for the path towards the destination sink or client node*

(10) Return the network simulation

4. RESULT ANALYSIS

The performance of the proposed model has been analyzed on the basis of end to end delay, number of aggregators and energy consumption. All of the above parameters analyze the various aspects of the network performance, which includes the total latency, number of intermediate nodes among the selected routes and overall energy consumption. The latency based analytical study shows the results in the figure 4.1, which ranges between the 0.8 and 0.1 milliseconds on various network events. The average value for the end to end delay (overall latency) has been recorded nearly between 3-4 milliseconds, which posts the robust an and extreme results and proves the robust performance of the proposed model. This simulation involves the total of 120 nodes, and represents the average latency at 0.0004 seconds. The sufficient number of nodes has been taken for the simulation, which shows the nearly efficient and real-time results in this simulation.

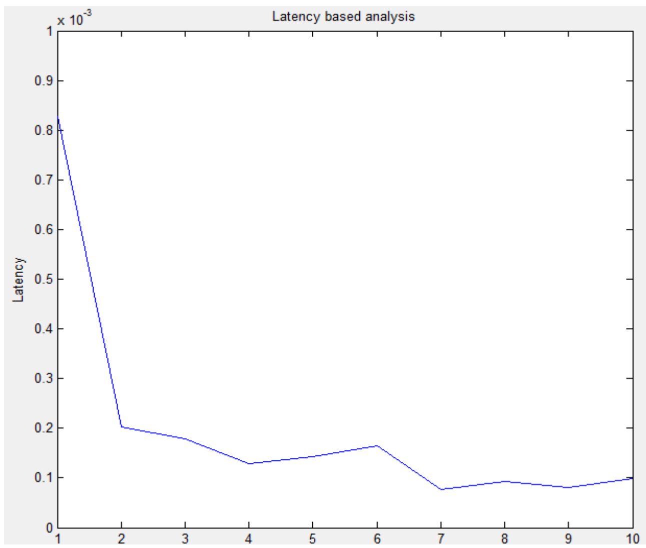

Figure 4.1: The latency based analysis on 120 node simulation

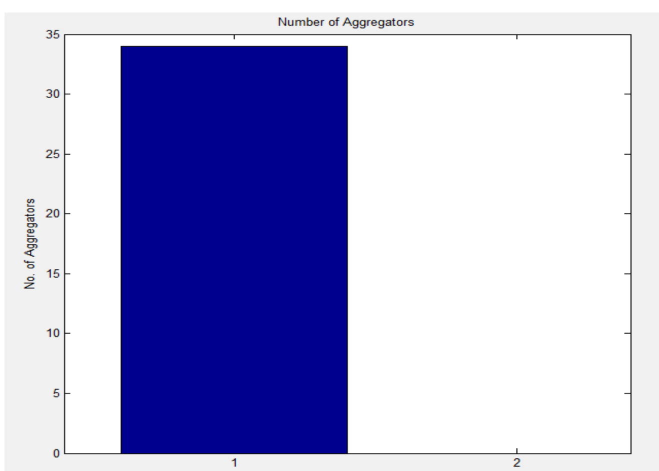

Figure 4.2.: Number of Intermediate (Aggregators) node in the selected routes

The number of intermediate nodes plays the vital role in the case of routing among the mesh networks, where the mesh nodes are represented as the intermediate nodes when the network routes are formed. The higher number of intermediate nodes produces higher energy consumption based models, whereas the ideal routing should keep the optimal number of nodes among the paths to offer the robust routing in the mesh networks. The average of 33-34 intermediate nodes in the given simulation has been recorded, which consumes nearly 25% nodes in the total simulation density for the construction of the network backbone. This shows the significance of nearly 5 nodes from the backbone towards the edge nodes.

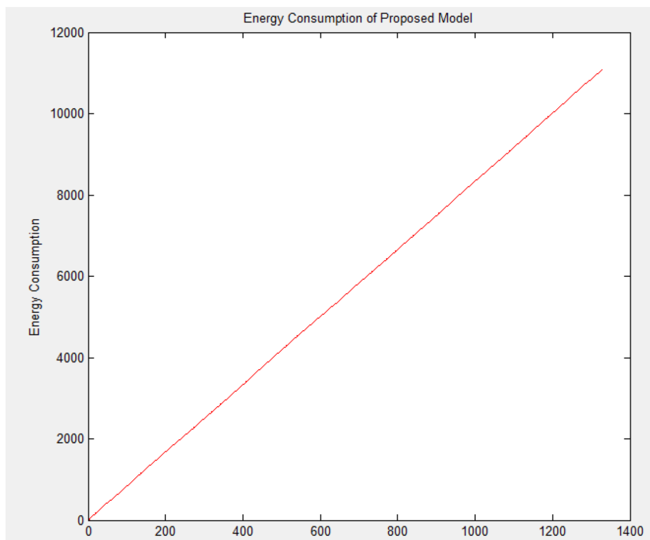

Figure 4.3: Consumption of energy has been shown among the network simulation with 120 nodes

The energy consumption is the primary parameter, which indicates the consumption of energy on every intermediate nodes. The higher number of intermediate nodes consumes the higher amounts of energy among the mesh network cluster, which is clearly prevented in proposed model simulation. The proposed model is found successful in offering the routing service with the minimum number of nodes, which makes it more efficient and flexible as well as energy efficient.

5. CONCLUSION

The mesh network routing has emerged as an important area for research among these days, as the coverage of mesh networks have increased quickly among the last two decade. The mesh network integrates the various network standards to offer the service oriented infrastructure. The mesh networks facilitate the roaming for the users among the various types of networks for consumption of standard services, whom internal working mechanisms may differ in different networks types. In this simulation, 120 mesh nodes have been involved under the simulation scenario, where performance indicates the higher performance of the proposed model. The performance parameters of energy consumption, end-to-end delay and number of intermediate (aggregator) nodes have been analyzed in the simulation. The proposed model has been found efficient on the basis of all of the performance parameters. The straight curve of energy consumption has been recorded as well as the 33 number of nodes has been found nearly at 33 nodes in the backbone construction. The average delay has been recorded between the 3-4 milliseconds in the given simulation.

REFERENCES

[1] Si, Weisheng, Albert Y. Zomaya, and Selvadurai Selvakennedy. "A geometric deployment and routing scheme for directional wireless mesh networks." *Computers, IEEE Transactions on* 63, no. 6 (2014): 1323-1335.

[2] Buddhikot, Milind M., Scott C. Miller, and Anand Prabhu Subramanian. "Interference aware routing in multi-radio wireless mesh networks." U.S. Patent 8,532,023, issued September 10, 2013.

[3] Peng, Yuhuai, Yao Yu, Lei Guo, Dingde Jiang, and Qiming Gai. "An efficient joint channel assignment and QoS routing protocol for IEEE 802.11 multi-radio multi-channel wireless mesh networks." *Journal of Network and Computer Applications* 36, no. 2 (2013): 843-857.

[4] Jakllari, Gentian, Stephan Eidenbenz, Nicolas Hengartner, Srikanth V. Krishnamurthy, and Michalis Faloutsos. "Link positions matter: A noncommutative routing metric for wireless mesh networks." *Mobile Computing, IEEE Transactions on* 11, no. 1 (2012): 61-72.

[5] Ding, Yong, Kanthakumar Pongaliur, and Li Xiao. "Channel allocation and routing in hybrid multichannel multiradio wireless mesh networks." *Mobile Computing, IEEE Transactions on* 12, no. 2 (2013): 206-218.

[6] Sheikh, S. M., R. Wolhuter, and G. J. van Rooyen. "A comparative analysis of MANET routing protocols for low cost rural telemetry Wireless Mesh Networks." In *Emerging Trends in Networks and Computer Communications (ETNCC), 2015 International Conference on*, pp. 32-37. IEEE, 2015.

[7] Chen, Jing, Kun He, Ruiying Du, Minghui Zheng, Yang Xiang, and Quan Yuan. "Dominating set and network coding-based routing in wireless mesh networks." *Parallel and Distributed Systems, IEEE Transactions on* 26, no. 2 (2015): 423-433.

[8] Chakraborty, Dibakar. "i-QCA: An intelligent framework for quality of service multicast routing in multichannel multiradio wireless mesh networks." *Ad Hoc Networks* 33 (2015): 221-232.

[9] Lall, Shruti, B. T. J. Maharaj, and PA Jansen van Vuuren. "Null-frequency jamming of a proactive routing protocol in wireless mesh networks." *Journal of Network and Computer Applications* (2015).

[10] Lai, I-Wei, Wen-Chung Kao, and Nobuo Funabiki. "Cross-layer selective routing for active access-point minimization in wireless mesh network." In*Consumer Electronics-Taiwan (ICCE-TW), 2015 IEEE International Conference on*, pp. 482-483. IEEE, 2015.

[11] Shim, Young-Chul. "An efficient geocast algorithm using 2-hop neighbour knowledge in sensor networks." *International journal of latest trends in computing* 2, no. 4 (2011).

[12] Cheng, Long, Chengdong Wu, Yunzhou Zhang, Hao Wu, Mengxin Li, and Carsten Maple. "A survey of localization in wireless sensor network."*International Journal of Distributed Sensor Networks* 2012 (2012).

[13] Sarkar, Santonu, and Rohit Datta. "A trust based protocol for energy-efficient routing in self-organized MANETs." In *India Conference (INDICON), 2012 Annual IEEE*, pp. 1084-1089. IEEE, 2012.

[14] Sinha, Jayashri Deb, and Subhabrata Barman. "Energy efficient routing mechanism in wireless sensor network." In *Recent Advances in Information Technology (RAIT), 2012 1st International Conference on*, pp. 300-305. IEEE, 2012.

[15] Barfunga, Sonam Palden, Piyush Rai, and Hiren Kumar Deva Sarma. "Energy efficient cluster based routing protocol for Wireless Sensor Networks." In *Computer and Communication Engineering (ICCCE), 2012 International Conference on*, pp. 603-607. IEEE, 2012.

[16] Park, Geon Yong, Heeseong Kim, Hwi Woon Jeong, and Hee Yong Youn. "A novel cluster head selection method based on K-means algorithm for energy efficient wireless sensor network." In *Advanced Information Networking and Applications Workshops (WAINA), 2013 27th International Conference on*, pp. 910-915. IEEE, 2013.

[17] Daraghmi, Yousef-Awwad, Chih-Wei Yi, and Ivan Stojmenovic. "Forwarding methods in data dissemination and routing protocols for vehicular ad hoc networks." *Network, IEEE* 27, no. 6 (2013): 74-79.