EVALUATION OF QUEUEING THEORY FOR ENERGY CONSUMPTION IN WIRELESS NETWORK

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ABSTRACT

Network is important to convey the data at the proper time for a wide range of networks applications, particularly wellbeing applications. A data around an occasion isn't worth if it comes after a specific interim of time. An impact happens if more than one hub begins sending the bundle at a similar case of time over a similar channel. All the impacted parcels should be retransmitted. A Wireless Network (WN) can self-heal and self-organize in a dynamic environment. The capacity ensures that the failure of a particular link to a node due to various reasons does not lead to node isolation. In Queueing Theory based Stability node analysis the default routing in networks are derived from the presentrules. But they fail to utilize the partial infrastructure feature of the WNs. Markov chain model and travel probabilities are utilized for accepting out the delay and throughput for networks. The Markov chain display is the noticeable model to gauge the execution of any framework. A model for a wireless hub utilizing Markov chain investigation about multihop networks is proposed determine the different probabilities, for example, sit out of gear, effective transmission. Ant based pressure and rest planning method is proposed. In this approach at first, the data of the hubs is limited and followed through Ant Colony Optimization (ACO) procedure. After the restriction procedure, the data which must be transmitted to the goal hub is compacted so as to make the network more proficient. In this paper, the performance of the existing algorithms like the Path Delay Analysis, Minimum Spanning Tree (MST), Group Based Multi Routing Adapted (GBMRA) and Airtime Queueing Theory Link Metric (AQTLM) is compared with that of the proposed protocol QTACA. So, the QTACA would best suit WNs, which have both stationary nodes and mobile clients.

Keywords: Queueing Theory Based Ant Colony Approach (QTACA), Minimum Spanning Tree (MST), Group Based Multi Routing Adapted (GBMRA) and Airtime Queueing Theory Link Metric (AQTLM), Node Mode Analysis (NMA), Markov Chain and Wireless network.

I. INTRODUCTION

Ant colony streamlining is proposed utilizing grapple hubs. At first an arrangement of stay hubs are sent utilizing the separation between the hubs. The Ant based routing convention is utilized to locate the best course with the most brief hop remove by procuring the closeness data between each match of grapple hubs. At the point when a sensor hub identifies the objective, the confinement procedure is done utilizing the grapple hubs and the situation of the objective is followed utilizing Ant specialists and the accumulated data is transmitted to the sink.

This approach diminishes the inertness in recognizing the stay hubs and furthermore lessens the aggregate number of grapple hubs to be sent. A sensor hub actuation system is produced, where the sensor hubs are transformed into rest mode for a particular time interim. Restriction alludes to the capacity of deciding the situation of a sensor hub, with a satisfactory precision. Despite the fact that limitation is seen to be an execution determinant action in a WSN, it isn't the objective of the network. Indeed, limitation is a basic administration since it is relevant to numerous applications relies upon knowing the area of hubs.

In light of the Energy measures, the proposed framework (Queueing Theory Based Ant Colony Approach (QTACA)) is separated into three stages. The initial step depicts the way toward distinguishing the known adversaries and obscure rivals utilizing Ant Colony Optimization (ACO). The second stage develops the supporting Energy utilizing Node Mode Analysis (NMA) in Queueing Theory Based Ant Colony Approach for network. The third step indicates the Mitigation for Energy incorporated with Markov Chain (MEI-MC) conveyed to choose the suitable model for a given Energy issue in network. The Markov Chain show portrays the programmers by two criteria to characterize them as indicated by inspirations and abilities. The last stage strengthening Energy utilizing hub mode examination depicts the suspicious methodology of the ideal abuse of activity association and the Energy structure is researched both in static cases and flow cases.

II. Related Work

A scientific displaying of wireless sensor networks (WSNs) have concentrated predominantly on the streamlining viewpoints, Shockingly the issue identifying with execution investigation of data preparing and transmission at the hubs, have not gotten as much consideration. A lot of deferral to data really occurs at the hubs because of queue develop. Henceforth, understanding the part of queueing in WSN displaying is important. In this investigation the queueing as connected to WSNs and give knowledge to the present cutting edge and bearings for what's to come. The usage of queueing theory in WSNs is comprehensively arranged into four classes, to be specific, blockage control strategies, control portion plans, network execution assessment systems and booking plans. Keeping in mind the end goal to adequately do the plan of numerous parts of sensor networks, a great queueing examination is important. Queueing theory assumes a noteworthy part than has been underscored features the benefit of queueing theory in the outline and investigation of WSNs [1].

A subjective radio mesh network is a wireless mesh network (WMN) that sends intellectual radios for its hubs, and depends on astute and dynamic range access for its activity. Notwithstanding expanding range use and conquering range shortage, intellectual radio mesh networks were spurred by various potential applications. In a few circumstances, mesh hubs need to confine their transmission control levels so the obstruction they cause at the area of other mesh hubs in neighboring cells remains inside a recalculated edge that protects the required QoS. Nonetheless, confining the transmission control implies limiting the network scope. Abusing intellectual radios permits mesh hubs to recuperate this issue by broadening their scope on any accessible diverts in the essential band. Besides, ongoing exploration activities recommend the reconciliation of various heterogeneous wireless access networks into one subjective radio mesh network utilizing the capacity of intellectual radios to adjust to various transmission/gathering parameters like power, recurrence, balance, and medium access [2].

Efficient and timely response during accidents has received increased attention from practitioners and researchers. The sitting of emergency service facilities plays a important role in determining the efficiency of safety protection and emergency response. Fuzzy location-allocation model for large-scale emergencies is presented. Fuzzy theory is utilized to develop a queuing maximal covering location-allocation model which will be called fuzzy queuing maximal covering location-allocation model for determining the facility locations in response to large-scale emergencies. ACO algorithm is developed to solve and test the model through a large-scale emergency example [3].

Wireless Sensor Network (WSN) has been widely used in large sectors such as military, habitat, business, industrial, health and environment. WSN is part of a distributed system where elements such as routing, load balancing, energy efficiency, node localization, time synchronization, data aggregation and security were to be addressed to improve its efficiency, robustness, extendibility, applicability and reliability. Despite multiple approaches proposed to improve all these aspects [4].

In an ant colony optimization algorithm, the choice of each path depends on two concepts. pheromone concentration and heuristic information. Pheromone refers to the chemical substances secreted by each ant in the process of finding a path. When the ant successfully finds the target node, pheromones will increase in a certain level. Heuristic information is a priori knowledge about the link, and, in most cases, it refers to the cost of selecting the path or the connection state of the link. The ant colony optimization algorithm is mainly divided into two parts: the transition probability criterion and the parameter definition. The criterion of transition probability is how to choose the next hop according to the transition probability [5].

III. ANT-COLONY OPTIMIZATION (ACO)

The ant-colony enhancement is the primary stage depicts the way toward distinguishing the hub associated with the Queueing Theory Based Ant Colony Approach. The relief issues in network are fathomed utilizing the QTACA which is performed utilizing exploratory based advancement. The model incorporated with ant colony advancement works with Known rivals that are distinguished in light of the pheromone thickness saved in the network path and Obscure competitors that are related to new path investigation with traversal of path.

The exploratory based path display assesses both with known and obscure rivals. Known rivals are determined by testimony of pheromone thickness, and obscure adversaries are figured by traversal of path with investigation made on the advancement of new path. Its gives an answer for the issues of event demonstrating, designation of protection resources and streamlining of reaction activities. Additionally, the heuristic ant colony streamlining upgrades the network. Network Energy framework assumes the specialist testament in charge of creation and circulation of advanced marks to all hubs entering the network. Once a hub turns into a piece of the network, it analyzes the execution including credibility of different hubs utilizing all the accessible sensor data. Till the time it endures to be in contact with the base station, it sends the data back to AC and makes it responsible for leading non-renouncement and disposing of a few hubs from the network.

For ACO display, reaction, the safeguard hub allocates guard resources to the same or another path portion by its technique. The result of a specific hub is gotten by the match lattice, which comprises of the cost or result esteems for every conceivable activity response blend. The model access is an element of the essentialness of each hub portion, the danger of identification i.e. gains from catch for the assailant and additionally a further factor. In like manner, the hub grid G is characterized as Equation (1).

$$G = G(p,m) = \begin{cases} C(m), if p \neq m \\ R, if p = m, \ \ p, m \epsilon n \end{cases} \quad (1)$$

Where C(m) is characterized in Equation (1) and r is a changeless scalar which shows the hazard or punishment of catch for the assailant (advantage for a safeguard), if the protector enables resources to the situation of the assault, i.e., a similar square on the guide.

The grid of cost and settlements is doled out to be known to both the protector and the aggressor. The aggressor's gain is equivalent to the safeguard's misfortune, and the other way around. The hub has the lattice which is characterized in Equation (2) and Equation (3). Each such two-hubs proclaims an answer in blended systems, and the arrangement is acquired by unraveling the accompanying pair of primal-double straight programming issues

$$Max_x v = \begin{cases} \sum_p G(p,m), if x_p \geq v, \forall m \in N, \\ \sum_p X_p = 1, if x_p \geq 0, \forall p \in N \end{cases} \quad (2)$$

$$Max_y w = \begin{cases} \sum_p G(p,m), if y_m \geq w, \forall p \in N, \\ \sum_p Y_p = 1, if y_p \geq 0, \forall m \in N \end{cases} \quad (3)$$

Since the two issues are sensible and similarly double, by duality theory, the large portion of the v will be equivalent to the base of w. Subsequently, the esteem v = w is the estimation of the diversion, that compares to the harmony gain and misfortune for the assailant and safeguard, separately. Here, the vector x is the harmony system of the assailant. The vector y is the protection procedure.

The calculation depicted the great dissemination procedure of beginning ants and dynamic refreshing of heuristic parameter and portrayed as,

Step 1: Set parameters, begin with initializing parameters

Step 2: Compute the highest entropy

Loop /* at this stage each circuit is called iteration*/

Step 3: Every ant is situated on a starting node consistent with distribution approach (every node has minimum one ant)

Step 4: For k=1 to m do /*at this stage every loop is termed as a step */

Step 5: At the initial step moves every ant at diverse route

Step 6: Repeat [step 7 and step 8]

Step 7: Choose node j to be called next according to the subsequent node and must not be called by the ant.

Step 8: An experiential is applied

Step 9: Until ant k finishes a tour repeat steps 7 & 8

Step 10: End for

Step 11: Local hunt are involved to progress explore

Step 12: Compute defensive measure of current pheromone trails

Step 13: Update the heuristic parameter

Step 14: Until End condition

Step 15: End

The above algorithm describes the process of ant colony optimization to improve the Energy and the next section describes the performance evaluation of the proposed work.

IV. PERFORMANCE EVALUATION

The planned QTACAalgorithm is simulated, and the presentation of the protocol is appraised. The network throughput, regular end-to-end delay and the procedure overhead on the network traffic are studied, and the results are obtainable in this section.These parameters are associated with the existing Path delay analysis, Minimum Spanning Tree Based Queuing (MST), A Grouping Based Multi- Routing Adapted (GBMRA), Airtime Queueing theory link Metric (AQTLM). Its detailed simulation result is given below.

Throughput

A throughput is some packages delivered to the destination per unit of time. The metric throughput measures how well the network can continuously provide data to the sink. Throughput is the number of packets arriving at the sink per milliseconds.

Table I: Comparative Table of Throughput Ratio

Time in ms	Path delay analysis in %	MST in %	GBMRA in %	AQTLM in %	QTACA in %
2	0	0	0	0	0
4	11	15	46	56	59
6	19	23	52	69	71
8	36	42	66	73	81
10	42	56	79	91	95

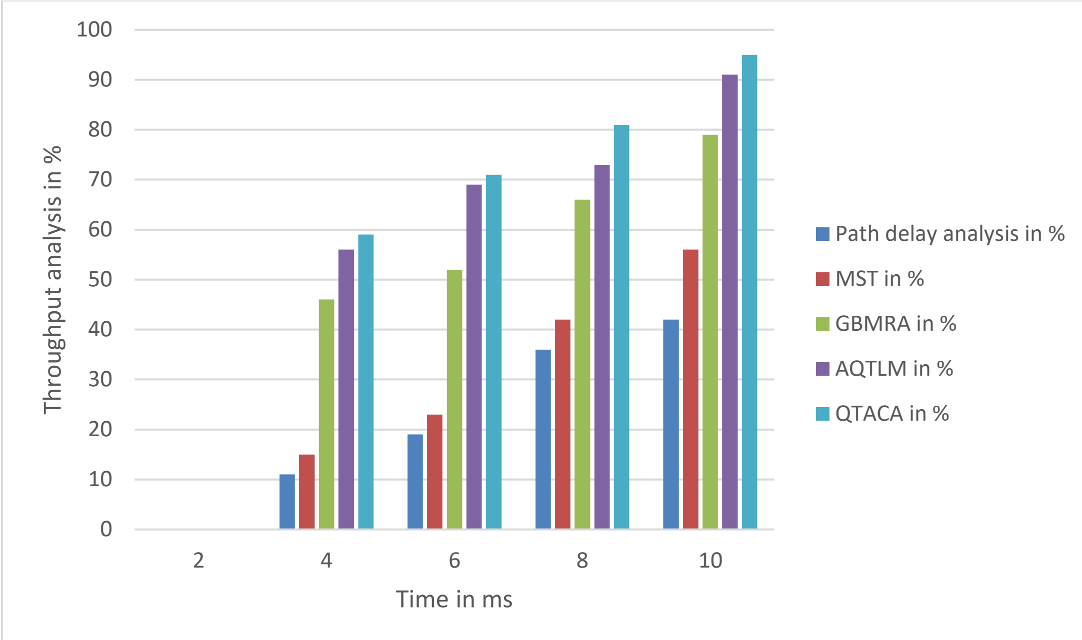

Fig. 1: Throughput Ratio of Different Methods

Figure-1 shows the overall performance ratio of various ways, and it is clear that the proposed plan has achieved higher throughput than other methods.

V. PACKET DELIVERY RATIO

It's used toward survey idea through the framework. It represents extent among all packets in the network. In source to destination how many packets will be send in particular time it's called delivery ratio.

PDR = Packets received/Produced parcels * 100.

Table 2: Comparative Table for Delivery Ratio

Time in ms	Path delay analysis in %	MST in %	GBMRA in %	AQTLM in %	QTACA in %
2	26	32	39	52	59
4	37	43	51	59	63
6	46	57	61	65	72
8	57	71	79	81	89
10	89	92	93	95	97

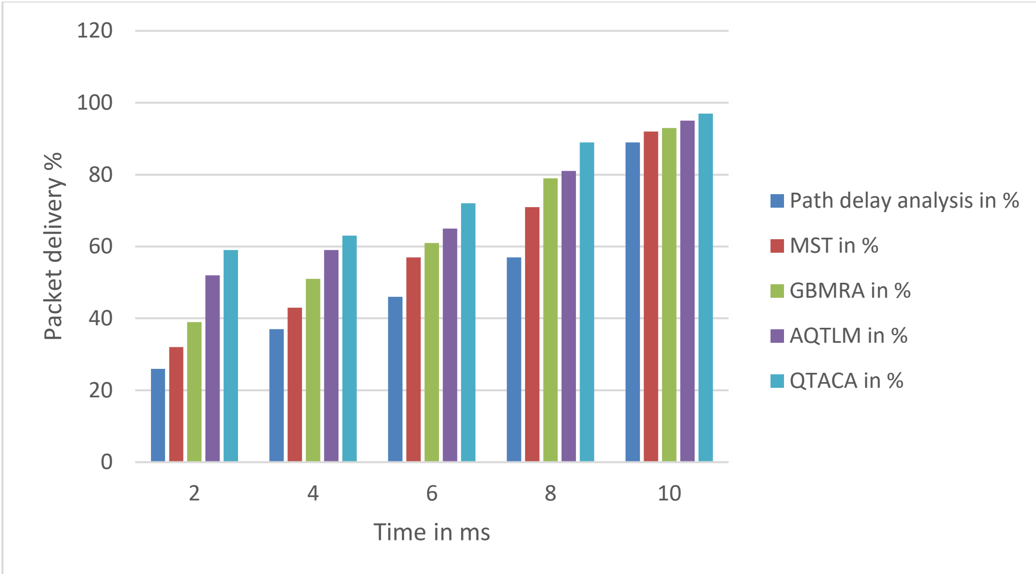

Fig. 2. Performance Packet Delivery Ratio

Figure-2 shows the performance of packet delivery ratio of different algorithms, and it indicates that the proposed method has higher packet delivery ratio than other ways.

Average Packet Delay

End to end delay is nothing but between the times to taken from one packet to another packets in network. That time to take all kind of parameter in data transmission.

Table 3: Comparative Table for Delay

Time in ms	Path delay analysis in %	MST in %	GBMRA in %	AQTLM in %	QTACA in %
2	16	13	11	9	5
4	36	33	31	29	21
6	59	51	45	41	36
8	82	79	71	65	59
10	94	93	89	84	80

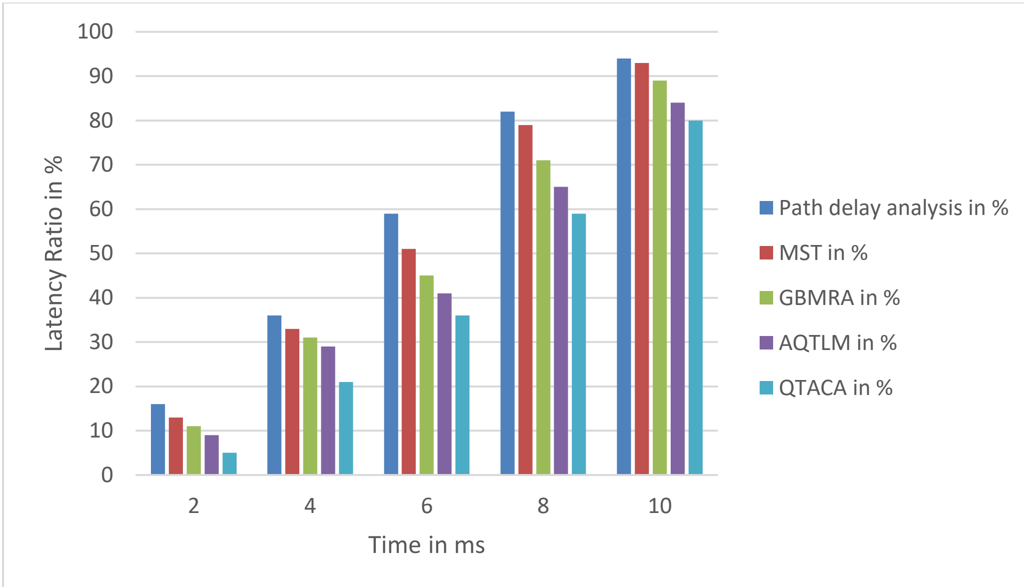

Fig. 3: Performance End-to-End Delay

Figure-3 shows the Delay ratio of different methods, and it shows clearly that the proposed plan has lower latency rate than others.

VI. CONCLUSION

In this paper, the performance of the existing algorithms like the Path Delay Analysis, MST, GBMRA and AQTLM is compared with that of the proposed protocol QTACA. All the current routing procedures recommended for IEEE 802.11 s WNs reflect the hop count or the QTACAto find the best pathway to the destination. The concept of node mode analysis based routing is proposed, and the simulation performances of theQTACA, algorithms are presented in this paper. From the results obtained, it is understood that networks like a wireless network in which all the nodes are movable, can use the existing procedures such as the MSTQT, GBMRA and AQTLM. But WNs which are partially infrastructure based should use routing protocols in which the path metric should utilize the stability of the network. So the QTACA would best suit WNs, which have both stationary nodes and mobile clients.

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