

Distributed Three Hop Routing Protocol for Enhancing Routing Process in WSN

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Abstract: For Hybrid wireless network there is need of efficient data routing protocol for improvement of network capability and scalability. By using Distributed Three Hop routing protocol (DTR), we improve capacity of Hybrid network and Reduce overhead. In early Two- Hop Transmission protocol is used for eliminate route maintenance and limited number of hop in routing for Hybrid Wireless Network but it only considers the node transmission within a single cell while DTR can Also deals with Inter-cell communication in real word. DTR is Top-quality from Other routing Protocol to analyses the hybrid wireless networks with the parametric quantity such as throughput, QoS, packet loss, overhead (due to traffic), channel quality, load balancing, routing delivery, scalability and power consumption. DTR also has a congestion control algorithm to avoid load congestion in base station in the case of unbalanced traffic distributions in networks. DTR makes significantly lower overhead by eliminating route monitoring and maintenance. To enhance the efficiency of routing protocol in wireless network Weight Based Data Assignment technique is used for data allocation in distributed routing protocol using the technique of least delay detection to maintain less data congestion in the network . for that DTR divides a message data stream into segments and transmits the segments in a distributed manner.

Keywords: Data Fragmentation, Responses Delay, Hybrid Wireless Network, Three of Routing Protocol, Fuzzy Logic.

I. INTRODUCTION

The problems become an obstacle in achieving high throughput capacity and scalability in hybrid wireless networks. Considering the widespread BSes, the mobile nodes have a high probability of exact Base station while moving across. From advantage of this particular feature, we elaborate a Distributed Three-hop Data Routing protocol (DTR)[1]. In DTR, form one network a source node distribute a message stream into a number of segments, Each segment is sent to a neighbor mobile node. Hybrid wireless network combining the advantages of mobile-ad-hoc and base station. HWN Overcomes the limitation to enhance life time, the output capacity and scalability of wide area network. Most of recent routing protocol join the cellular transmission mode in base station wireless network and ad-hoc transmission mode in mobile ad-hoc network to increase attention to their high performance.[2]

Hybrid highly support for real time transmission. DTR improve feature of hybrid wireless network by dividing message into segment, The source node select its neighbor for forwarding message by considerable features as high bandwidth and minimum delay and again transmit the segment to destination through selected network path. Thus by using DTR protocol it achieve the high throughput capacity in network. It chooses the relay mode which has the higher capacity node.[2][3]DTR techniques is provide high time complexity as compare to other routing protocols. DTR uses to increase the strength of hybrid wireless network related to performance.

DTR focuses to incorporate major features which are of more reliability, more scalability, better performance, load balancing, high throughput capacity. Due to increasing level of wireless communication in today environment, people often requires distributed environment for sharing their data between the nodes. For according an effective communication to user, many researchers proposed very few methods to provide three hop routing protocol that guaranteed routing for hybrid networks, they strive to improve the network capacity and reliability but they evade constrain in securing the data. For this problem our main objective of this project is to improve the effective and efficiency of routing approach with constrains over hybrid wireless data streaming using Distributed Three -hop routing protocols intermediate nodes[4]

Throughput represents the long-term data transmission rate in which network can support. The throughput capacity of a wireless network depends on network architecture, bandwidth constraints and power, routing strategy, radio interference, etc. here Different network models are available for wireless data networks under the probabilistic routing transmission delay means the amount of time it takes for a message to be transmitted from its source to destination.[5] DTR generate the smallest delay. In DTR, message is divided into three segment then large amount of segment data send to the minimum delay and small amount of segment data send to maximum delay. The time required for a packet sent from the source node to reach the Base station is called as end to end delay. The transmission delay depend on number of hops in network.

Fuzzy logic describes reasoning system in which the notion of truth and false are considered in a graded fashion for finding path. in opposite with classical mathematics where only a exactly true statement are considered. When the system model and its performance is not considerable, then fuzzy logic is useful in taking decision and control the situation. our proposal based on a fuzzy logic based system and random any cast in which the user is selected randomly. Using the fuzzy logic-based system, the energy consumption for each data frame is reduced as per requirement. This mechanism to select the relaying node from the number of user is supported by a fuzzy-based logic system which takes into account the connectivity of the user, its distance to the network, its remaining energy and the number of available candidates. By means of simulations, we have describes the effectiveness of our algorithm as our scheme is able to reduce the energy consumption as per transmission.[6]

Based on the QoS in hybrid wireless network,, they choose mobile relay nodes between direct transmission or relay transmission to the Base Station. In the relay transmission, a segment is forward to another mobile node with higher capacity and performance to a BSes than the present node. In direct transmission for wireless network, a segment is directly send to a BSes[9]. In the infrastructure, the segments are reorganized in their main order and sent to the destination node. The number of routing hops in DTR is approximate to three, consider all two hops in the ad-hoc transmission mode and one hop in the cellular transmission mode. To overcome the aforesaid disadvantage, DTR make sure to limit the number of hops. The first hop forwarding distributed manner the segments of a message in different directions to fully utilize the resources, and the possible second hop forwarding assure the high capacity and performance of the forwarder. DTR also has a congestion control algorithm to balance the traffic load and avoid congestion in between the nearby Bses and network.[1]

This paper dedicates section 2 for related work, where as section 3 describes the proposed technique in detail. The evaluation of proposed is done in section 4. In the end paper is concluded with option for extension in section 5.

2. REVIEW OF LITERATURE

When the system model and its performance are not well known, then fuzzy logic is useful in taking decision and control the situations. Author **Feng Xia says**, the fuzzy logic is based on quality of service management scheme for wireless sensor networks with the limitation of resources and in a random and changeable environment. Taking this advantage for the response on control technology, this strategy deals with the effect of chances of changing the traffic load on the Quality of service of wireless sensor networks. In this paper it utilizes a fuzzy logic controller in all sources of sensor node to adjust sampling period to the deadline miss ratio associated with data transmission from the source to the destination. The drawback for this paper is to improve the quality of service in fuzzy logic for large scale in wireless sensor networks example advanced in unified framework.[6]

Author **Manpreet Singh Dang** says that, a fuzzy logic is based on strategy of selection of base station at the time of system is presented. In this paper, fuzzy logic has been used to reached at the decision about the target of Base Station to

be chosen such that the switchings between Base Stations are made gradual. . The drawback for this paper is to provide clear quality of service in fuzzy logic for better response time in system requested networks.[7]

Quality of Service is organized for data transfer between source to destination in the network. Characteristics of data transmissions are Information exchange rate (transmission speed), Transfer features in networks(delay) , Quality of authentication (mortality rate) .Quality Of Service plays the important role for effective utilization of bandwidth and the lowest energy consumption. Author **Seyedjamal Zolhavarieh** described in this paper about the concept of Quality of Service in Wireless Sensor Networks. The Quality of Service is organized for data transfer between different parts of the networks and it guarantees some series of transport properties on the networks. Quality of Service manage the communication between workstations connected to the access point and it also can categorize traffic control based on different security zones with different risk levels through using Virtual Local Area Network Technology. Drawback of this paper is Quality of Service strategy is used in traditional networks may not be feasible in wireless networks. [8]

Author **Flammini Luca Forlizzi** discuss in this paper about some of the most related topics which are based Quality of Service in wireless networks,concentrate on our attention on aspects like survivability, data access and layout design.

Drawback of this paper the Quality of Service of Wireless Sensor Networks get disappointment when delay and/or packet loss rate are too large. Therefore, Quality of Service management paradigms are needed to increase the flexibility and adaptability of wireless sensor networks with respect to the become different network conditions.[9]

Auther **SalwaOthme** elaborate the Multi-hop Cellular Network (MCN) is a promising architecture aiming to improve the performance of the current single hop cellular network. Indeed, it combine the flexibility of Ad Hoc network and the benefits of the fixed infrastructure. The traffic is relay through multi-hop communication, which can expand the coverage area and get high throughput. The MCN combine the characteristic of the Ad Hoc networks and the cellular architecture .classify to enhance the security in the MCN, we intend a new secure routing protocol. Multi-hop communication organized for the classify to enhance the performance of the network in terms of throughput, energy consumption and quality of service (QoS) .The Multi-hop Cellular Networks (MCN), the traffic is relay pass on hop by hop from a source to the target destination. here Multi-hop Cellular Networks, the completion of a reliable routing protocol which ensure both the network act and the security requirement is a challenging task. The drawback for this paper, the suggest a secure routing protocol which selects shortest pathway between a source and its target destination. [10]

Auther **Ahmed M. Safwat** discuss the best knowledge, this was the first time that directive antenna were used by mobile nodes to decrease interference, conserve energy and improve spatial reprocess in a multi-hop cellular network. when the system model the presented analytical models to compute the estimated end-to-end delay and the connection and system throughput in multi-hop networks. The models assume that relations are allotted their own resources independently of all other active connections. The drawback for This paper quantitative outcome get from the models were utilized to build up a framework.[11]

Auther **Yong-Tae Park** elaborate The data fragmentation scheme using a block acknowledgment (BA) mechanism to reduce the number of the control packets and delayed transmission. A special challenge in WSNs is transmission of a hugs amount of data, like video and image, that is becoming more and more required in various applications. A wireless network is very much layer to communication errors. Thus, for the capable design, the large data messages are broken down into smaller fragments and those smaller fragments are transmitted. Data fragmentation scheme that can be used for energy-efficient MAC protocol design for WSN. The block acknowledgment (BA)mechanism for a new fragmentation which can increase energy efficiency and decrease transmission delay by reducing control packet overhead. Advantage of saving energy from retransmission but it still has some drawbacks,very fragment needs to be acknowledged, it introduces the control packet overhead and also increases the transmission delay.[12]

Auther **Yassine Hadjadj-Aoul** explain the data fragmentation scheme to increase channel utilization and avoid collision. In Fragmentation a data frame dividing into a short frame and attempt its transmission in the current frame and transmit the remaining frame in the next super-frame. The data fragmentation mechanism is modeled using a Markov chains. A non-saturated traffic and acknowledgement transmission are considered in our reasoning. The analytical results of the normalized throughput show the improvement of the bandwidth occupation when using the proposed data fragmentation mechanism in the IEEE 802.15.4 slotted CSMA/CA protocol.[13]

3. SYSTEM ARCHITECTURE

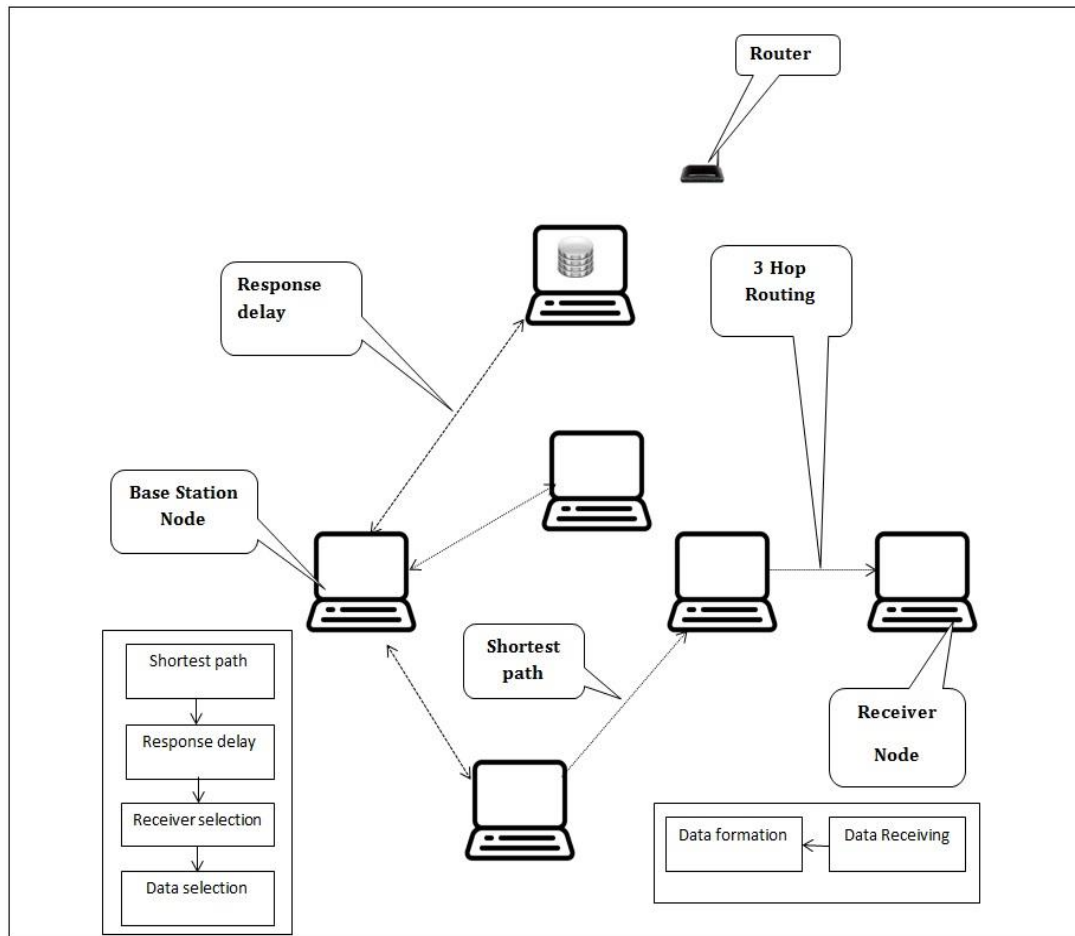


Fig. 3. System Overview

The proposed methodology of distributed three hop routing protocol based on data weight based scheme technique can be represented through figure 3 and its working pattern is discussed with the below mentioned steps.

Step 1: In the very first step of the model user selects the data that need to be deliver to the receiver. Once the receiver and data is selected for routing then system evaluates the shortest path using fuzzy logic theory. According to this theory all the nodes will assign random integers and this random values are formed a matrix of node weight. This node weight matrix subjected for the evaluation of the shortest path, Where five fuzzy crisp values are being created like low, very low, medium, high and very high based on the node weight. These fuzzy crisp values are forming fuzzy rules, which are eventually gives rise to the shortest path based on the IF-THEN rules. This can be summarized along with the following algorithm

Algorithm 1: For Shortest Path Calculation using Fuzzy Logic

//Input: Data Fragment D_i , Node Weight as N_{wi}

//Output: Shortest path

Step 0: Start

Step 1: Node Weight Matrix as MAT

Step 2: FOR $i=0$ TO row

Step 3: FOR $j=0$ TO column

Step 4: Fuzzy Crisp values F_c

Step 5: Fuzzy Rules as F_r

Step 6: Fuzzy IF-THEN rules

Step 7: Shortest path $S_p = \int F_c \rightarrow F_r$

Step 8: END Inner FOR

Step 9: END Outer FOR

Step 10: Return S_p

Step 11: Stop

Step 2: once the Shortest path is calculated then system the identifies all other nodes that are not involved in the shortest path. And then system automatically sends a hand shaking message to all these nodes and receives the reply from all of them, there by records the time delay of all nodes. Now based on the best top two time delays nodes are considered along with the next immediate node from the source node from the evolved shortest path. So these three nodes are finalized for data fragmentation process and for three HOP process. Then the data is been fragmented based on the ratio of the time delay got from the three nodes. The node which is having highest time delay receives the chunk with lowest size and vice versa. The process of data partition and assignment can be clearly shown with the below algorithm.

Algorithm 2: For Weight based Data Allocation based on Response Delay

//Input: User data as D

//Output: Assignment of $D_1, D_2, D_3, \dots, D_n$ to $N_1, N_2, N_3, \dots, N_n$

Where,

D_n Represents Data Segment

N_n Represents Node

Step 0: Start

Step 1: Ping String S to N_1, N_2, N_3

Step 2: Response Delay Collection set as $R_d = \{ R_{d1}, R_{d2}, R_{d3} \}$

Step 3: $R_s = \sum R_d$

Step 4: $D_w = \int R_{di} / R_s$ (Data Weight Ratio)

Step 5: $\int D_w \rightarrow D_i$

Step 6: $D_i \rightarrow N_i$

Step 7: Stop

Step 3: Data Routing This step involves the mechanism of data routing to the receiver. Where parallel data routing process triggers with the three data chunks along with the shortest path. In the process all the data chunks are labeled and handled according to the label. Once all the chunks reaches to the receiver then based on the labels and data is been merged at the receiver end to form the original data with the desired extensions.

4. SYSTEM ANALYSIS

For the experimental process of the distributed three hop routing protocol system we uses five machines of standard configuration with core i3 processor and 4GB RAM. All the machines are equipped with Windows operating system and all are having java supporting features which are using Netbeans as the development IDE. Experiment is conducted for data transmission in our system using distributed three hop routing protocol and end to end transmission delay recorded as in table 1.

Table 1: End to end Delay record for different data size in Distributed three hop routing protocol

Data Size in KB	End to end Delay in milliseconds
100	122
500	354
1000	477
1500	594
2000	881

The plot in figure 4 indicates that on steep increasing of the data size our system of distributed three hop routing protocol yields average end to end delay that is not directly proportional to the data size. This indicates that the effective approach of the data segmentation based on the response delay of the neighboring node acts as catalyst for data transmission techniques.

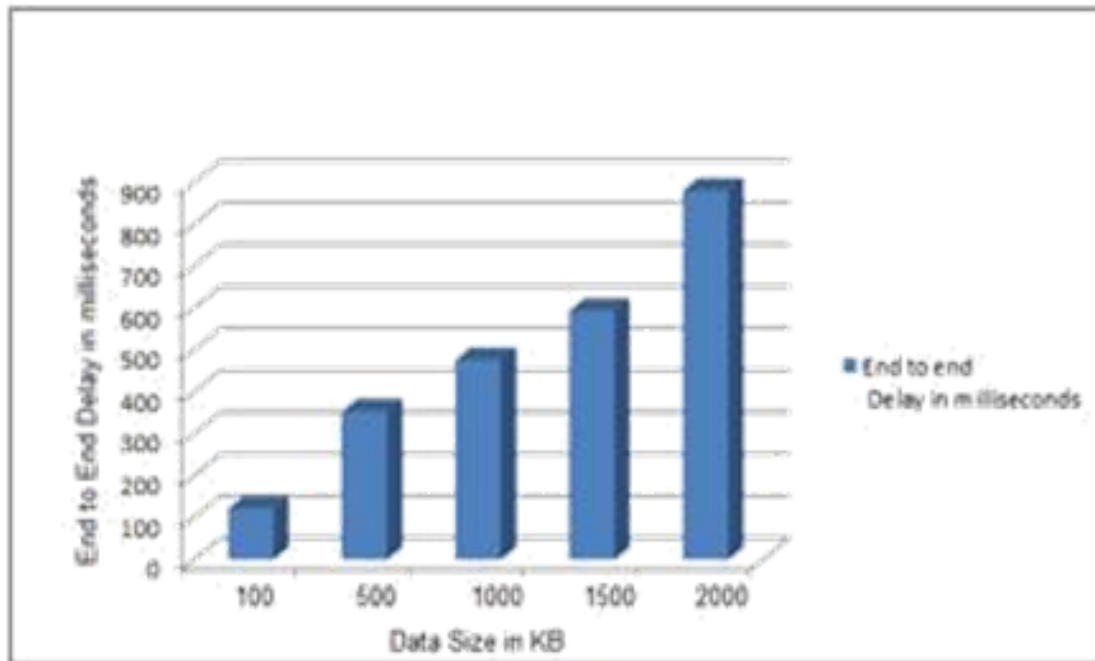


Fig. 4. Average End to End delay for different data size

5. CONCLUSION

As we are aware of the fact that in almost all the routing protocols in wireless network routing used to happen based on the routing sequence provided by shortest path algorithms. This technique always utilizes the wireless nodes that are part of the shortest path sequence for data routing, this makes all other nodes to stay idle. Due to this a considerable delay in data transmission is always existed. So the proposed system uses the distributed three hop routing protocol technique where it involves maximum possible nodes from the network for routing process to decrease the end to end transmission delay. This process is powered with the theme of weight based data assignment technique based on the neighbor node response delay. This empowers the system to perform better to select the best shortest and fastest path of routing. The proposed system can be enhance in the future by considering multiple hop routing protocol to get best end to end transmission delay on increasing of number of nodes in the network.

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