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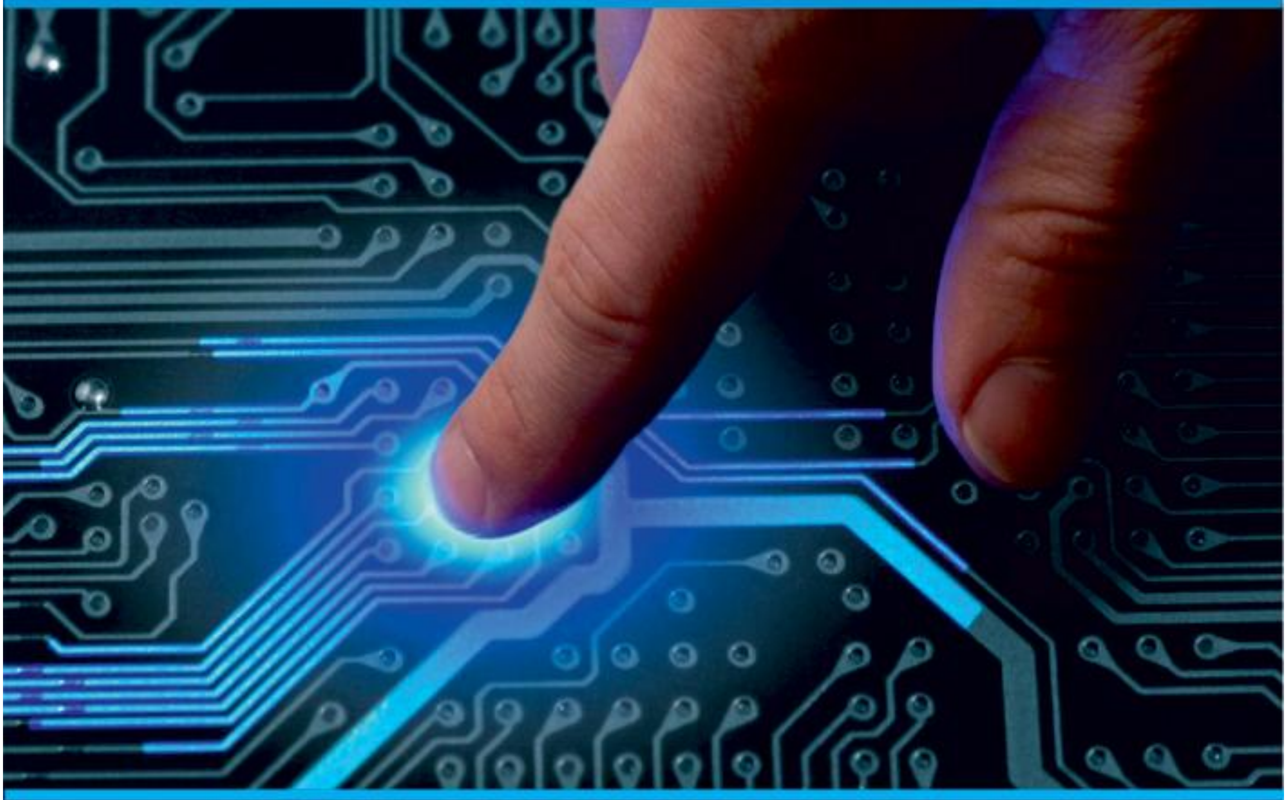

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An Efficient Algorithm for Data Aggregation in 5G Wireless Sensor Network

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ABSTRACT: The 5G networks are digital cellular networks, in which the service area covered by providers is divided into small geographical areas called cells. The new 5G wireless devices also have 4G LTE capabilities, as the new networks use 4G for initially establishing the connection with the cell, as well as in locations where 5G access is not available. Data aggregation schemes play a vital role in enhancing overall efficiency of such networks. The main goal of data aggregation scheme is to collect and aggregate data packets in an efficient manner in order to reduce power consumption, traffic congestion, and to increase network lifetime. This paper proposed an efficient algorithm for data aggregation in 5G wireless sensor networks based on joint clustering and routing scheme.

KEYWORDS: 5G, data aggregation, LTE, 4G, Lifetime, Packets, power.

I. INTRODUCTION

The 5G networks are digital cellular networks, in which the service area covered by providers is divided into small geographical areas called cells. Analog signals representing sounds and images are digitized in the telephone, converted by an analog-to-digital converter and transmitted as a stream of bits. All the 5G wireless devices in a cell communicate by radio waves with a local antenna array and low power automated transceiver (transmitter and receiver) in the cell, over frequency channels assigned by the transceiver from a pool of frequencies that are reused in other cells. The local antennas are connected with the telephone network and the Internet by a high-bandwidth optical fiber or wireless backhaul connection. As in other cell networks, a mobile device crossing from one cell to another is automatically "handed off" seamlessly to the new cell. 5G can support up to a million devices per square kilometer, while 4G supports only up to 100,000 devices per square kilometer. The new 5G wireless devices also have 4G LTE capability, as the new networks use 4G for initially establishing the connection with the cell, as well as in locations where 5G access is not available. [6]

Verizon and a few others are using millimeter waves. Millimeter waves have a shorter range than microwaves; therefore the cells are limited to a smaller size. Millimeter waves also have more trouble passing through building walls.[8] Millimeter wave antennas are smaller than the large antennas used in previous cellular networks. Some are only a few inches (several centimeters) long.

Massive MIMO (multiple-input multiple-output) was deployed in 4G as early as 2016 and typically used 32 to 128 small antennas at each cell. In the right frequencies and configuration, it can increase performance from 4 to 10 times. Multiple bitstreams of data are transmitted simultaneously. In a technique called beamforming, the base station computer will continuously calculate the best route for radio waves to reach each wireless device and will organize multiple antennas to work together as phased arrays to create beams of millimeter waves to reach the device Advancement in small scale hardware framework is the significant reason for the advancement of 5G WSN in the period of twenty first century. 5G WSN has gotten fundamental for day by day client, without 5G WSN our work would have been very weight or hard. 5G WSN are skilled of detecting, changing and course of the data. These sensor nodes are commonly organized in a various space like in war space where human are difficult to reach. 5G WSN create enormous measure of data in type of bits or stream. These nodes contact over an exact scope of nodes which are outline in a specially appointed structure and get the data to the sink. 5G WSN have many constrained assets like restricted energy, memory, calculation power, correspondence limit and so on.

There are a few IoT applications which are based on 5G WSNS [1], for example, social insurance observing, vehicular checking, fire timberland observing, road checking, condition checking and so on. These networks are the type of framework that is made of hundreds or thousands of wireless sensors with a lot of assets which are utilized in an extremely wide scope of field. In the earlier years, we have seen the utilization of recently created conventions for data assortment in WSN.

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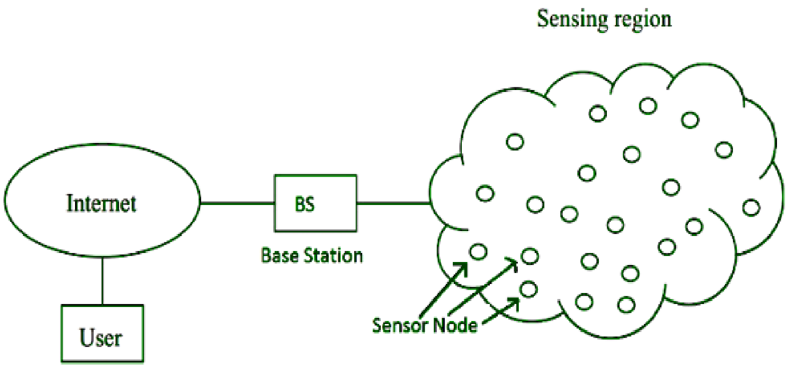

Figure 1: Wireless sensing region

These sensors are disseminated in a region which is being watched and data is gathered continuously and identified with the physical condition [2]. Sensors take a shot at batteries. It is impracticable to change the battery for the network. For expanding the network lifetime, it is awesome advance for structuring the calculation so the transmission amount can be diminished. Various undertakings are taken to reduce the quantity of unfortunate transmissions in sensor network. The data collection strategies increment energy utilization in WSN.

II. LITERATURE SURVEY

H. El Alami et al., [1] So as to accumulate data all the more efficiently, a clustering hierarchy calculation is utilized for data correspondence in wireless sensor networks (WSNs). This calculation is one of the significant strategies to improve the energy productivity in 5G WSNS and it gives a powerful way to augment the lifetime of WSNs. Hierarchical conventions based on clustering hierarchy are proposed to spare energy of 5G WSNS in which the nodes with higher residual energy could be utilized to gather data and transmit it to a base station.

M. A. Hossen et al., [2] Psychological radio (CR) is an adaptive radio innovation that can naturally identify accessible diverts in a wireless range and change transmission boundaries to improve radio working conduct. Because of the dynamic idea of range accessibility and wireless channel condition, it is exceptionally difficult to keep up solid network availability. Cluster-based CR specially appointed networks (CRAHN) mastermind CR nodes into gatherings to successfully keep up solid self-governing networks. Clustering in CRAHN underpins agreeable assignments, for example, range detecting and channel administrations and accomplishes network versatility and dependability. In this paper, we proposed a Q-learning based cluster development approach in CRAHN, in which Q-esteem is utilized to assess every node's channel quality.

X. He et al., [3] In wireless sensor networks (WSNs), gathering data with mobile sinks is a compelling method to settle the "energy gap issue". In any case, a large portion of existing calculations of mobile sinks disregard the heap equalization of meeting nodes, which will altogether abbreviate the network lifetime. Additionally, most mobile sinks are generally required to visit areas of sensor nodes without exploiting their correspondence ranges. Along these lines, this paper proposes an energy-efficient direction arranging calculation (EETP) based on multi-target molecule swarm streamlining (MOPSO) to abbreviate the direction length of the mobile sink and equalization the heap of meeting nodes.

W. He et al., [4] An efficient and energy-sparing calculation, K-means and FAH (KAF), has been proposed to take care of the issues of node energy limitations, short network cycle and low throughput in current wireless sensor networks. Network clustering is gotten by upgrading K-implies clustering. Based on FAHP (Fluffy Logical Hierarchy Procedure) technique, the cluster head determination is upgraded thinking about the components of node energy, good ways from base station and energy proficiency of nodes. Based on the variables of transmission separation, energy and bounce number, multi-jump routing is built to successfully lessen the energy utilization of nodes in data transmission. The reenactment results show that contrasted and different conventions, KAF calculation has evident preferences in lessening node energy utilization, drawing out network life cycle and expanding network throughput. And under various routing convention, the exhibitions of the calculation are checked.

W. Osamy et al., [5] Data is totaled and compacted at CHs based on compressive detecting method. In routing layer, another proposed calculation to frame the routing tree as spine of the network is proposed. The routing tree is utilized to advance the packed data by CHs to the base station (BS). At long last, as a period of accumulation and remaking layer, a successful CS recreation calculation called Honey bee based sign reproduction (BEBR) is proposed to improve the recuperation procedure at the BS. BEBR uses the benefits of the avaricious calculation and Honey bees calculation to locate the ideal arrangement of reproduction process. Reproduction results uncover that the proposed conspire beats existing baseline calculations as far as solidness period, network lifetime, and normal standardized mean squared blunder for compressive detecting data remaking.

S. Phoemphon et al., [6] shows the examination upgrades DV-Bounce by: 1) diminishing the estimate inclusion to a particular zone, in this manner requiring less grapple nodes; 2) further diminishing the region utilizing a jumping box; and 3) embracing molecule swarm streamlining (PSO) by incorporating the quantity of jumps and stay nodes into the wellness capacity to improve the guess accuracy. To assess the proficiency of the proposed plot, the recreation results are contrasted and those of five as of late proposed DV-Jump limitation strategies: iDV-Bounce, DV-maxHop, Specific 3-Stay DV-Jump, PSODV-Bounce, and GA-PSODV-Jump.

S. Verma et al., [7] Wireless Sensor Networks has a greater advantage in today‘s communication application such as environmental, traffic, military, health monitoring. In such smart environments, people with smart devices (nodes) can freely self-organize and form self-configuring ad-hoc network to send and forward data packets to a destination over multiple hops via intermediate nodes.

III. PROPOSED WORK

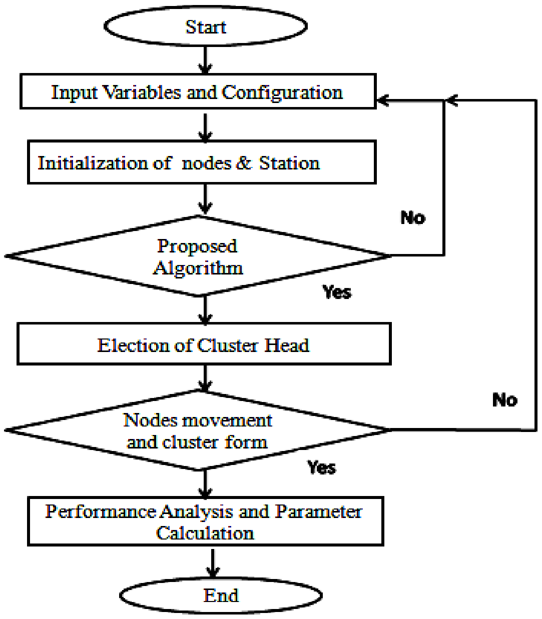

Figure 2: Flow Chart

Algorithm:
Step 1: Assign the number of node, the probability value.
Step 2: For the hop count h initialize the value of S(n+1)
Step 3: Check whether there are cluster head at the initial stage .
Step 4: Count the number of Cluster Head by CountCHs=0
Step 5: Initialize the Value of CH=1 then verify the number of live node and dead node.
Step 6: Check the count of number of Packets to CH and Packets to BS and Packets to BS per Round.
Step 7: Calculate the number of epoch performed.
Step 8: Check the number of dead node.
Step 9: Perform the election of Cluster Head to the normal nodes.
Step 10: Calculate the energy dissipated.
Step 11: Calculate the number of Cluster Head.

IV. SIMULATION AND RESULTS

The implementation of the proposed algorithm is done over MATLAB 8.3 (R2014a). The communication processing toolbox helps us to use the functions available in MATLAB Library.

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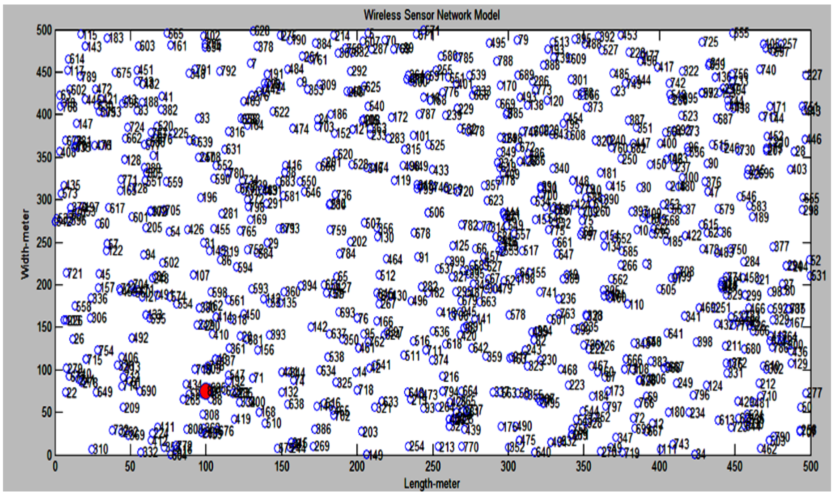

Figure 3: Simulation area 300m X 300m

Figure 3 show the simulation scenario where length and width of wireless sensors network area is 500m X 500m. Total nodes taken are 100 to 1000. In this step all variables, mobile agent and configuration are initialize the simulation.

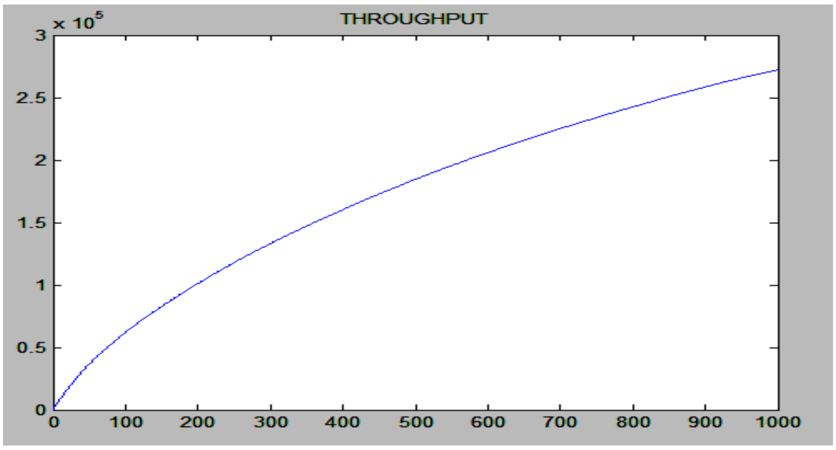

Figure 4: Data transmission rate or throughput

This figure 4 presents the data transmission rate or throughput rate. It is clear that the throughput is 275Kbps.

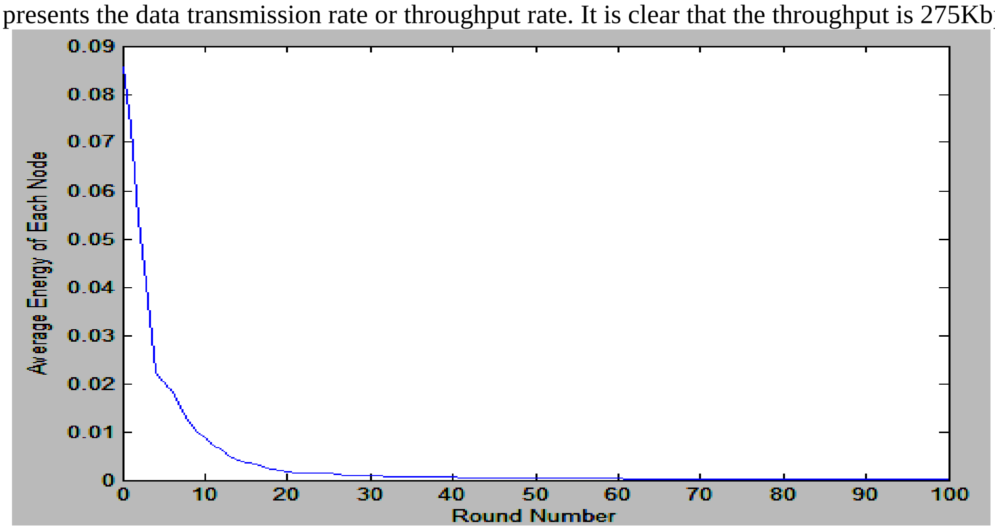

Figure 5: Average energy of each node

This figure 5 shows that the average energy of each nodes. Therefore 0.1 J to approx negligible energy take by each node.

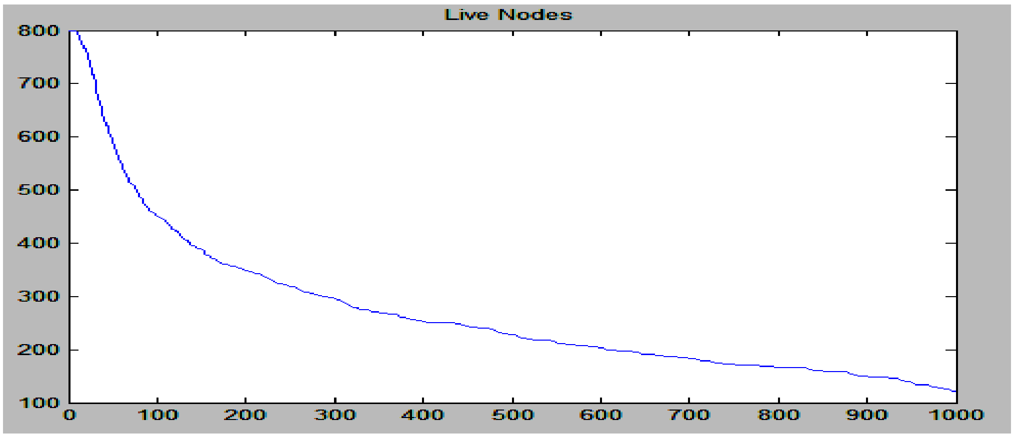

Figure 6: live nodes

This figure 6 shows that the total lives nodes during round of simulation. Therefore total 200 nodes live in 1000 rounds.

Table 1: Comparison of proposed work result with previous work

Sr No.	Parameters	Previous Work	Proposed Work
1	Simulation area	500m X500m	500m X500m
2	Total nodes	200 to 800	200 to 800
3	Methodology	Novel Approach	Joint Cluster
4	Network transfer rate (Throughput)	250 Kbps	275 Kbps
5	Data size	200 byte	400 byte
6	Node Energy consumed	5 nJ	1 nJ
7	MA code size	1024 bytes	200 bytes
8	Execution time	1000 Sec	164.9 seconds
9	Overall energy consumption	1000 J	380 J

V. CONCLUSION

This paper proposed joint clustering convention approach. It consider all out recreation region 500X500 meter and nodes region taken 200, 800 during nodes reproduction. Proposed technique based on joint cluster while past methodology based on novel strategy. Network move rate or throughput is accomplished by proposed strategy is 275Kbps while past it is accomplished 250Kbps. Reenactment time is additionally diminished upto 835 Sec. The general energy utilization is 380J while past it is 1000J. In this manner it very well may be say that the proposed technique approach gives noteworthy better execution in wireless sensor netowrk than past methodology.

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