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A Technique For Fair Scheduling For Uplink and Downlink in 4G LTE Using Firefly

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Abstract
In the current research the enhancement of the secured MANET routing protocol is done. The 4G uplink and downlink scheduling is chosen for enhancement due to the low QOS. Encryption is quite an important parameter in the MANET. To make PROPOSED more secure 3d cryptography technique is implemented in it for secure transmission. By applying the encryrption technique in the PROPOSED, sometimes the overheads are introduced in it. To overcome the problem of data dropped, load and encryption overheads in the network, an optimization technique called Adaptive ACO are used. Using the above mentioned optimization technique the data dropped and the losses in the network are reduced to some extent. The above defined results have shown the parameters that are improved using a network simulator called MATLAB. The PROPOSED generates much load on the network and the packets start delayed in network. This problem is reduced in the proposed approach using an optimization technique which makes multiple paths to the packets that are sent to the destination. By using the exactly reciprocal path the network can send data through multiple paths and the load in the network can be reduced.

Keywords
Include at least 5 keywords or phrases

I. Introduction

A computer network is a telecommunication network which enables hubs to share assets. In PC systems, arranged registering gadgets trade information with each other utilizing an information interface. The associations between hubs are set up utilizing either link media or remote media. The best-known PC arrange is the Internet. System PC gadgets that start, course and end the information are called organize nodes.[1] Nodes can incorporate has, for example, PCs, telephones, servers and additionally organizing equipment. Two such gadgets can be said to be arranged together when one gadget can trade data with the other gadget, regardless of whether they have an immediate association with each other.

PC systems vary in the transmission medium used to convey their signs, interchanges conventions to arrange organize activity, the system's size, topology and hierarchical goal. PC systems bolster a colossal number of uses and administrations, for example, access to the World Wide Web, advanced video, computerized sound, shared utilization of use and capacity servers, printers, and fax machines, and utilization of email and texting applications and additionally numerous others. As a rule, application-particular correspondences conventions are layered (i.e. conveyed as payload) over other more broad correspondences conventions.

II. Mobile Generation

From the early analog mobile generation(1G) to the last executed third generation (3G) the paradigm has changed. The new versatile eras don't put on a show to enhance the voice correspondence encounter however attempt to give the client access to another worldwide correspondence reality. The point is to achieve correspondence omnipresence (inevitably, all over) and to furnish clients with another arrangement of administrations. The development of the quantity of portable supporters in the course of the most recent years prompted an immersion of voice-situated remote communication. From various 214 million supporters in 1997 to 1.162 millions of every 2002 [1], it is anticipated that by 2010 there will be 1700 million endorsers overall [2] (see Figure 1). It is presently time to investigate new requests and to discover better approaches to expand the portable idea. The initial steps have just been taken by the 2.5G, which gave clients access to an information arrange (e.g. Web get to, MMS - Multimedia Message Service). Be that as it may, clients and applications requested more correspondence control. As a reaction to this request another era with new norms has been produced - 3G. Notwithstanding the enormous beginning rapture that advanced this innovation, just a single 3G organize exists in business utilize today. This system has been sent in Japan in 2001 utilizing worldwide standard IMT-2000, with extraordinary achievement.

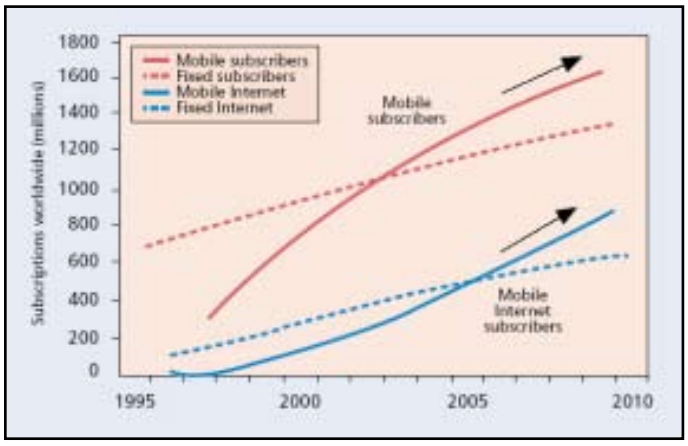

Fig. 1 : Evolution of mobile and fixed subscribers [10]

In the last years, benefiting from 3G constant delays, many new mobile technologies were deployed with great success (e.g. Wi-Fi). Now, all this new technologies (e.g. UMTS, Wi-Fi, Bluetooth) claim for a convergence that can only be achieved by a new mobile generation. This new mobile generation to be deployed must work with many mobile technologies while being transparent to the final user.

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final user.

III. 4G LTE

Long Term Evolution (LTE) is a standard for fast remote correspondence for cell phones and information terminals, in light of the GSM/EDGE and UMTS/HSPA advancements. It builds the limit and speed utilizing an alternate radio interface together with center system enhancements. The standard is created by the 3GPP (third Generation Partnership Project) and is determined in its Release 8 archive arrangement, with minor improvements portrayed in Release 9. LTE is the overhaul way for bearers with both GSM/UMTS systems and CDMA2000 systems. The diverse LTE frequencies and groups utilized as a part of various nations imply that exclusive multi-band telephones can utilize LTE in all nations where it is bolstered.

LTE remains for Long Term Evolution and is an enrolled trademark possessed by ETSI (European Telecommunications Standards Institute) for the remote information correspondences innovation and an improvement of the GSM/UMTS measures. Be that as it may, different countries and organizations do assume a dynamic part in the LTE extend. The objective of LTE was to expand the limit and speed of remote information systems utilizing new DSP (advanced flag preparing) procedures and balances that were produced around the turn of the thousand years. A further objective was the upgrade and rearrangements of the system engineering to an IP-based framework with altogether decreased exchange dormancy contrasted with the 3G design. The LTE remote interface is inconsistent with 2G and 3G systems, so it must be worked on a different radio range.

The goal of the 3G was to build up another convention and new advancements to additionally upgrade the versatile experience. Interestingly, the new 4G system to be built up will endeavor to fulfill new levels of client encounter and multi-benefit limit by likewise coordinating all the versatile advancements that exist (e.g. GSM - Global System for Mobile Communications, GPRS - General Packet Radio Service, IMT-2000 - International Mobile Communications, Wi-Fi - Wireless Fidelity, Bluetooth).

Disregarding extraordinary methodologies, each subsequent from various dreams without bounds stage as of now under scrutiny, the principle goals of 4G systems can be expressed in the accompanying properties:

- Ubiquity;
- Multi-benefit stage;
- Low bit cost;

IV. LTE Scheduler

The Long Term Evolution (LTE) cell correspondence framework has developed as a quickly developing common innovation, conveying an assorted variety of portable broadband administrations, in the correspondence showcase. The LTE particulars have been institutionalized to use Orthogonal Frequency Division Multiple Access (OFDMA) as the transmission conspire, dispatched to complete the downlink correspondence. The OFDMA transmission plot in contrasting and the old one (Code Division Multiple Access) gives a key favorable position of adaptability for asset allotment chiefs in abusing recurrence assorted variety. A LTE scheduler is relied upon to dispense radio assets proficiently to help a high assortment of administrations and augment framework throughput. In any case, it is a pivotal issue to fulfill all objectives in the meantime. Each factor can be provided at the cost of diminishing another.

V. QoS in LTE

An adaptable QoS-arranged scheduler, partitioned into Time Domain (TD) and Frequency Domain (FD), was presented in for constant video movement. The proposed calculation considers landing rate and head of line parcel delay as compelling QoS factors for multiuser asset circulation. To rearrange the multifaceted nature of the asset assignment technique, it has been parceled into three separate stages: QoS classes recognized characterization, time area and recurrence space booking. At the initial step every carrier is ordered into individual QoS class in view of its CQI factors. At that point the TD scheduler organizes the arranged bearers as per their QoS information rate prerequisites and orders them into discrete organized applicant bearers: GBR and Non-GBR. GBR bearers regularly convey continuous applications which are touchy to postpone and should be presented with an ensured bit rate. OSA calculation sorts each GBR carrier as per the Head of Line (HOL) bundle delay in the cradle of the related conveyor.

The positioning capacity of conventional booking calculations which are just in view of the line's need, disregarding different measurements, would force an absence of adequate judgment over the asset portion process. Because of this testing issue, LTE presented Knapsack planning calculation with accentuation on over-burden states. This class-based asset allotment calculation underpins QoS requirements by requesting the bearers utilizing a positioning capacity ascertained in light of the different measurements, including GBR/Non-GBR class need, conveyor line status, parcel misfortune and deferral. Be that as it may, since the fundamental volume of the LTE arrange movement is ongoing administrations, developing in a hazardous way, particularly video and VoIP, the decency issue among these administrations shapes a noteworthy test and additionally QoS bolster in current systems.

VI. Related Study

Nasim Ferdosian et al. [1] tended to this principal issue of LTE downlink booking by embracing the time-area Knapsack calculation over the activity over-burden examples and adjust the Knapsack calculation, to defeat this issue and enhance framework execution destinations. In LTE frameworks, multicast administrations must be conveyed proficiently because of the requirement for solid QoS bolster. Be that as it may, each class of value administrations has its own necessities to be fulfilled. These quality limitations restrict the planning adaptability, and the LTE downlink asset distributing calculations need to acclimatize these requirements while attempting to boost framework execution as far as reasonableness and throughput.

Vikas Kaul et al. [2] introduced outline, execution, assessment and correlation of security improvements in information transmission for cutting edge encryption featuring the conceivable shortcomings inside the current AES encryption calculation. An upgraded encryption strategy with AES calculation is utilized here inside TLS. Upgrade is done in AES by first utilizing disorder and after that adjusting the S-box .The utilization of turmoil grouping makes the key space unbounded and the static S-box is made dynamic utilizing figure key. To expand the intricacy of the framework, AES is incorporated in Round structure. The assessment concentrates on: Encryption-Decryption time, Throughput-speed and Avalanche impact.

Tarik Ghalut et al. [3] concentrated on the advancement of Quality of Experience (QoE) mindful enhancement downlink planning video movement stream. QoE is the general agreeableness of an

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administration or application, as saw subjectively by end clients and afterward presented a novel joining structure between hereditary calculation (GA) and irregular neural systems (RNN) connected to QoE-mindful enhancement of video stream downlink planning. The proposed structure has been connected and assessed utilizing an open source reenactment apparatus for LTE systems (LTE-Sim). An examination between our system and best in class LTE downlink planning calculations (FLS, EXP-govern, and LOG-administer) has been done under various system conditions.

Nora A. Ali et al. [4] presented general articulations for the SINR in homogeneous and in heterogeneous systems. In homogeneous systems, the articulation was connected for the most widely recognized sorts of recurrence reuse methods: delicate recurrence reuse (SFR) and partial recurrence reuse (FFR). The articulation was inspected by contrasting it and beforehand created ones in the writing and the correlation demonstrated that the articulation is substantial for a recurrence reuse plot and any system topology. Besides, the articulation was reached out to incorporate the heterogeneous system; the articulation incorporates the issue of co-level and cross-level obstruction in heterogeneous systems (HetNet) and it was inspected by a similar technique for the homogeneous one.

Ajay Kaushik et al. [5] examined physical layer of LTE handset for downlink direct in FDD (recurrence division duplexing) mode. Reproduction comes about investigations the throughput execution of LTE PDSCH channel for ETU (expanded run of the mill urban) display as far as SNR and for no. of edges transmitted.

Neelam Rani and Sanjeev Kumar [6] characterized the current ICIC strategies and explores the execution of reuse-1, reuse-3 plots under different client appropriations. Execution of cell-focus and cell-edge clients is investigated, and also the general otherworldly proficiency, throughput and system stack. Framework level recreations are played out that demonstrates the focal points and impediments of each of the inspected strategies under various system burdens and client circulations which is utilized to decide the most reasonable ICIC method to be utilized. In any case, the concurrent utilization of a similar Frequency in adjoining LTE cells that makes between cell impedance issues at cell-edge clients. Between Cell Interference Coordination (ICIC) procedures are sent to dodge the negative effect of obstruction on framework execution.

Varun Das and Shikha singh [7] explored that Long-Term Evolution (LTE) is a standard for fast remote correspondence for cell phones and information terminals. It depends on the GSM/EDGE and UMTS arrange advancements, expanding the limit and speed utilizing an alternate radio interface together with center system upgrades. The fundamental distinction between LTE and UMTS is that the LTE is simply parcel exchanged system. Amid blockage loss of bundles happens which influences the execution of LTE.

Prinima and Jyoti Pruthi [8] meant to address the development of portable correspondences, from its original, 1G, to the most recent 5G. This drives the fundamental aim of the mobile phone mammoths to look for the new innovation to beat their rivals. The clients can utilize these applications at whenever and anyplace through portable correspondence.

Senthilkumar Mathi and Lavanya Dharuman [9] pondered the defenselessness of desynchronization assault that happens when source goes about as rebel base station in 3GPP. Also, it examines how this assault endangers the correspondence in 4G arrange and along these lines proposes another plan to defeat this assault. In the proposed conspire, the objective produces its own key as opposed to utilizing the key created by source hub for future correspondence with focus to accomplish a safe correspondence between the source and target base station in 4G LTE.

Vasco Pereira and Tiago Sousa [10] tended to the advancement of portable correspondences, from its original, 1G, to the most recent 3G and give a look at not so distant of 4G. Portable interchanges assume a focal part in the voice/information organize field. With the sending of mass scale 3G practically around the bend, new bearings are as of now being inquired about.

VII. Problem Formulation

This current work had focused on downlink resource scheduling with QoS and fairness constraints for different quality classes in LTE networks. This technique describes the resource allocation as a multi-objective optimization problem, covering three main performance targets of LTE scheduling. The desired solution which is selecting and scheduling the best candidate bearers was provided by using a throughput aware knapsack algorithm to maximize the desired performance targets. With respect to average throughput measurements we can conclude that by modifying the Knapsack algorithm to use a throughput aware ranking function the system performance in terms of total throughput can be enhanced in several classes of QCI to the close levels.

A mobile network consists of one or more autonomous mobile nodes, each of which communicates directly or indirectly with the neighbor nodes within its radio range. The field of Mobile Network is rapidly growing due to varied advantage and applications. Energy efficiency is a challenge faced especially in designing a routing protocol. A single routing protocol is hard to satisfy all requirements. i.e., one routing protocol cannot be a solution for all energy efficient protocol that is designed to provide the maximum possible requirements, according to certain required scenarios.

1. There is not any alternative path for downlinks.
2. Data packets are dropped due to downlinks.
3. Decrease in throughput.
4. In case of link failure repeat rescan of network decreases the efficiency and reduce power of battery.
5. No improvement for increased delay.
6. Maximize the increased network lifetime.
7. In-secure transmission in routing protocols.

VIII. Flowchart

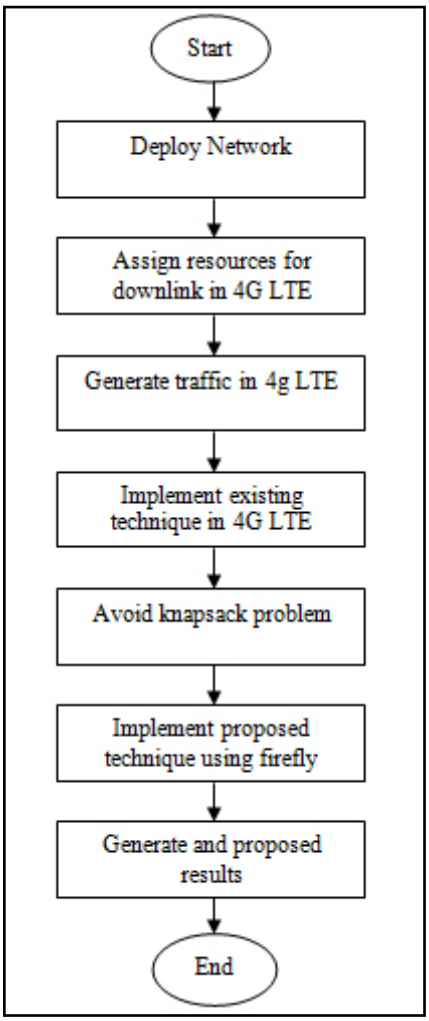

Fig 1: Flow chart

IX. AACO

Adaptive Ant Colony Optimization (AACO) is an adaptive technique to find partial solutions for the problems where identifying exact solution is either difficult or impossible. The problem of optimization is the most crucial problem in today's era and a great work has been done to solve it. During last few years, many optimization algorithms, like Ant Colony Optimization (ACO), Particle Optimization Problem (PSO), Artificial Bee Colony Algorithm (ABC), Differential evolution (De), Genetic algorithm (GA) etc., has been proposed. Ant Colony Optimization (ACO) [1] algorithm was proposed firstly in 1991 by Dorigo M. and was designed to simulate the foraging behavior of real ant colonies. ACO algorithms have been widely used for solving different combinational optimization problems such as Job-Scheduling Problem, Traveling Salesman Problem, and Vehicle Routing Problem etc. Various enhanced versions of the original ACO algorithms have been done over the years. For improving the quality of final solution and speedup of the algorithm, various strategies like dynamic control of solution construction, mergence of local search, partition of artificial ants into two groups: common ants and scout ants, strategies for updating new pheromone and using strategies of candidate lists are studied. ACO model may be better in the search result of the shortest route but some scenarios may have the other factors using the route selection such as favor, convenience, traffic on route, etc., in which AACO model can provide better support such other factors

X. Results and Discussion

In this scenario a comparison is made between hybrid routing schemes by taking 25 subscriber stations which is shown below.

Average Load:

The load in two MOBILE NETWORK protocols existing and proposed scenario in 100 nodes. From the above graph it is shown that the load in proposed approach is less than that of existing scenario. The value of network load in case of proposed system is approx 6KBps where as in case of existing approach it is more than 7 KBps which is approx 1 KB more than that of the proposed approach.

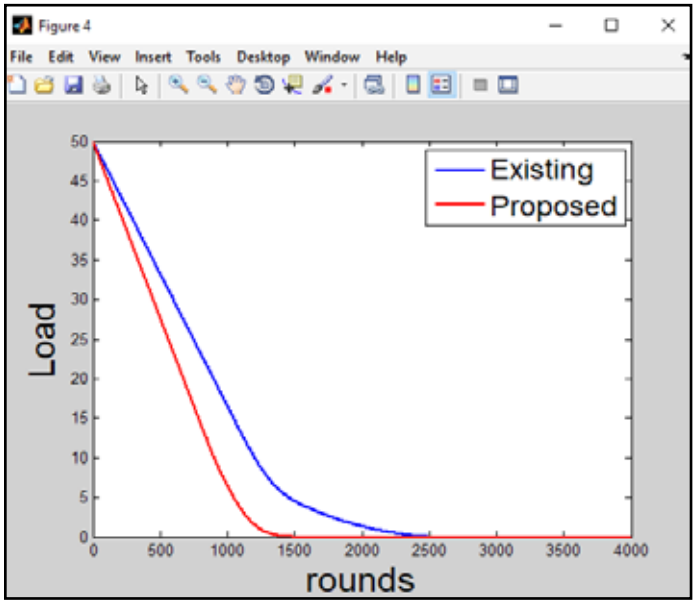

Fig 2: Average load

Packet Delivery Ratio

Packet delivery ratio is defined as the ratio of data packets received by the destinations to those generated by the sources. Mathematically, it can be defined as: PDR= S1÷ S2

Where, S1 is the sum of data packets received by the each destination and S2 is the sum of data packets generated by the each source. Graphs show the fraction of data packets that are successfully delivered during simulations time versus the number of nodes. The value of PDR in case of proposed system is approx 70packets/round where as in case of existing approach it is less than 40packets/sec which is approx 30 packetsless than that of the proposed approach.

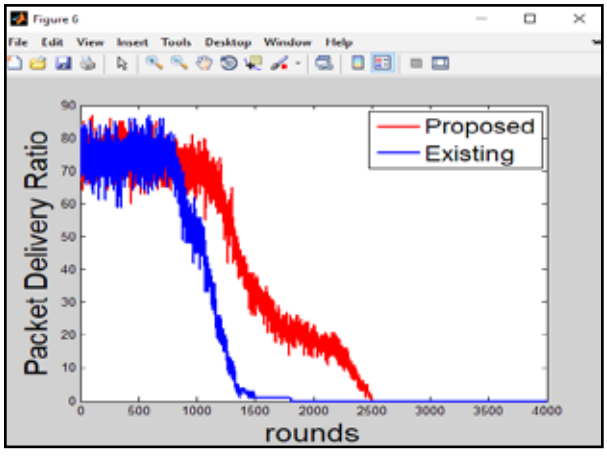

Fig 3: Packet Delivery Ratio

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Throughput

Throughput is the rate at which information is sent through the network. If a network becomes congested and there is good discipline, packets may queue up at the source and never enter the network. Those packets will not contribute to throughput, but because they are never sent, won't affect the PDR at all. Throughput in existing and proposed scenario in MOBILE NETWORK in 100 nodes. From the graph it can easily depicted that the throughput in proposed scenario is less than that of existing protocol. Throughput in case of proposed case is approx 110 packets and in existing case it is approx 100 packets.

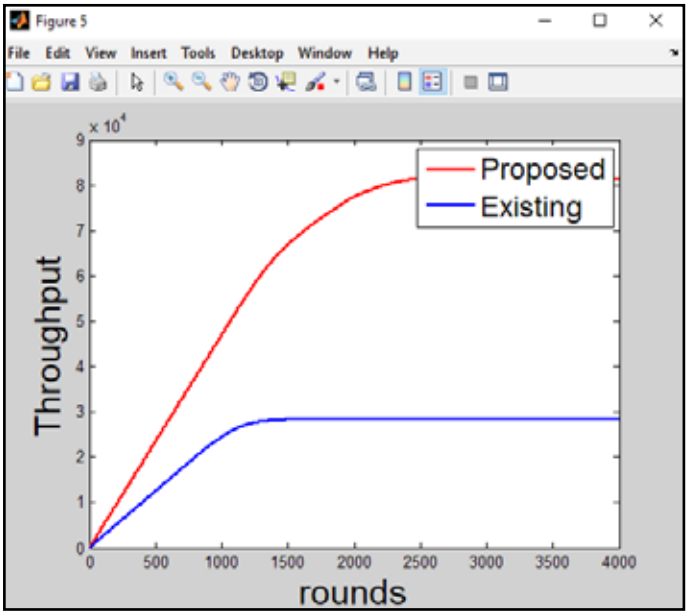

Fig 4: Throughput

Dead Nodes

The figure below is described about the number of dead nodes in the network, i.e. the nodes which do-not contain energy to transmit packets in network. If the energy dissipation of a node is higher then the number of dead nodes will be there shortly after when the network is alive. Now in the proposed scenario the number of alive nodes resides in the network till 2500 rounds where as in case of existing approach alive nodes resides upto 1500 rounds.

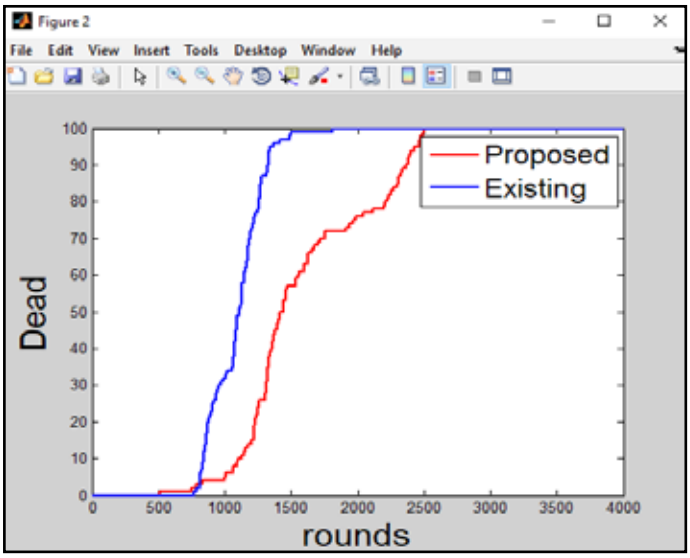

Fig 5: Dead Nodes

Percentage of alive nodes

The figure below is described about the percentage of alive nodes in the network, i.e. the nodes which contain energy to transmit packets in network. If the energy dissipation of a node is higher then the number of alive nodes will be dead shortly. Now in the proposed scenario the number of alive nodes resides in the network till 2500 rounds where as in case of existing approach alive nodes resides upto 1500 rounds. From this it is cleared that the proposed scenario is more energy efficient than that of existing one

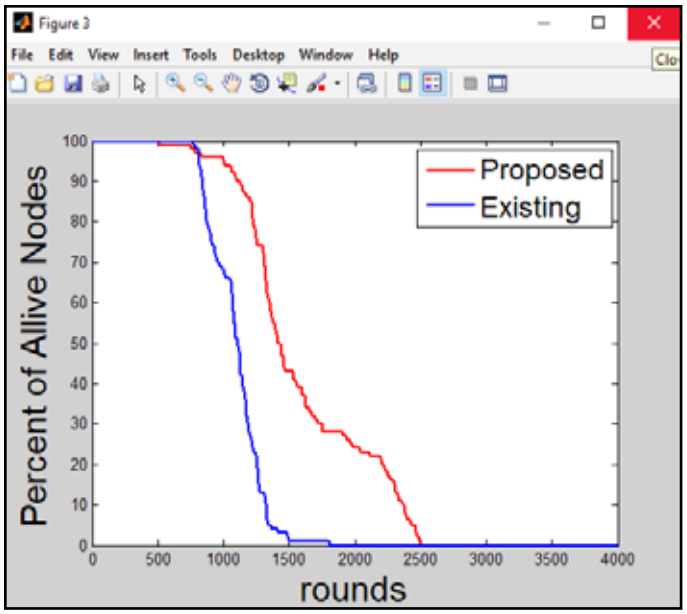

Fig 6: percentage of alive nodes

Energy Residual

The figure below is described about the residual energy in the network, i.e. the nodes which contain energy to transmit packets in network. Initial energy given in this scenario to all the nodes is 0.5 J. using this initial energy the energy dissipation in the proposed approach is lesser as compare to the energy consumption in the existing approach. From the figure it is clear that the residual energy reside in the proposed case is upto 2500 rounds where as in case of existing approach it is approx 1500 rounds.

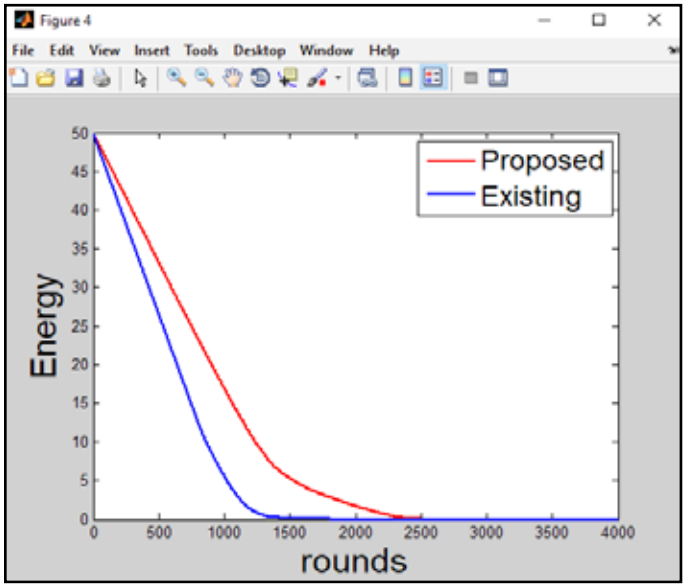

Fig 7: Energy

Table 4.1 Comparative study of various parameters for both algorithms

AlgorithmParameters	Existing	Proposed
Packet Delivery Ratio	40	70
Throughput(packets)	$3*10^4$	$8*10^4$
Dead	1700 rounds	2500 rounds
Alive Nodes	1700 rounds	2500 rounds
Energy	1700 rounds	2500 rounds

XI. Conclusion

A MOBILE NETWORK consists of tiny devices called sensor nodes. These small and micro nodes deployed over different geographical areas for monitoring physical phenomena like temperature, humidity, vibrations, and so on. A sensing node consists of three main units: a sensing unit to collect data from surrounding environment, a computing unit to process data and its storage, and a wireless communication unit for transmission of data over the network.

Wireless sensor networks have become increasingly popular for environmental and activity monitoring, such as temperature, pollution, parking space, traffic, and crowd monitoring. Mobile users can collect and visualize sensing data by communicating with wireless sensors along their walks using Bluetooth or NFC. They can also share the sensing data on the Internet through 3G or WiFi connectivity. Nevertheless, mobile users may not be able to collect all the data from the sensors due to limited contact times and batteries. In this research a review of different techniques to be used for clustering in MOBILE NETWORK.

The proposed techniques had extensively characterized data collection in Wireless Sensor Networks with Mobile Elements (MOBILE NETWORK-MEs). First it is provided a general definition of MOBILE NETWORK-MEs, then we presented a comprehensive taxonomy of their architectures, based on the role of the MEs. Furthermore, we discussed in depth the data collection process and highlighted its main challenges. This proposal finally analyzed each topic by a comparative survey of the approaches available in the literature. This analysis also provided hints for open research problems.

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