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Energy Efficiency Optimization & Resource Allocation of Cross-Layer Broad Band Wireless Communication Systems using Dynamic Particle Swarm Optimization

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ABSTRACT

In the Recent era of the Advancement of Internet Technology, the speed of information transmission increased gradually. At present 4G network provides speed only up to 8 mbps to 14mbps which is very low speed. But, 4G is not able to meet the current information transmission speed prerequisites of the network. In order to improve further development of the technology the 5G technology came in to existence. The 5G Innovation as the new correspondence improvement which came up to application level prior to advancing the advancement of 5G innovation. the issues it faces has likewise to be settled .In this paper we described the principle issues in 5G innovation are Asset portion and Energy Proficiency advancement to resolve these issues by using Dynamic Particle Swarm Optimization (DPOS) algorithm it is feasible to lessen Energy utilization just as Resource assignment issue. We proposed the algorithm to manage the issues in which best arrangement can be addressed as a point. Each time it calculates the frequency of the Particle if it is less than the 90dbm to 100 dbm then the Particle will be updated with the new frequency.Our fundamental point of venture is to tackle different items improvement issue with the assistance of dynamic PSO based on reenactment results .we introduced presume that the powerful PSO gives better upgraded an incentive for a considerable length of time streamlining issue.

KEYWORDS: *Wireless Communication Systems, Quality of Service, Energy efficiency, Resouce allocation.*

I. INTRODUCTION

Remote Communication is the Electromagnetic waves that move data between at least two focuses. The most well-known remote advancements utilize radio waves. The data from sender to beneficiary is done in a well- characterized channel. Each Channel has a decent recurrence transfer speed and limit [1].

Wireless Local Area Network (WLAN)

Wireless Local Area Network is a Near by region network which is used within the specified area only .The WLAN network which provides services through fixed channel assignment or through Dynamic channel assignment. Most of the cases we use Dynamic Channel only for the wireless communication systems .we need to use repeaters for long distance services between one base station to another base station. The Architecture of the Wireless communication Systems is shown in following diagram.

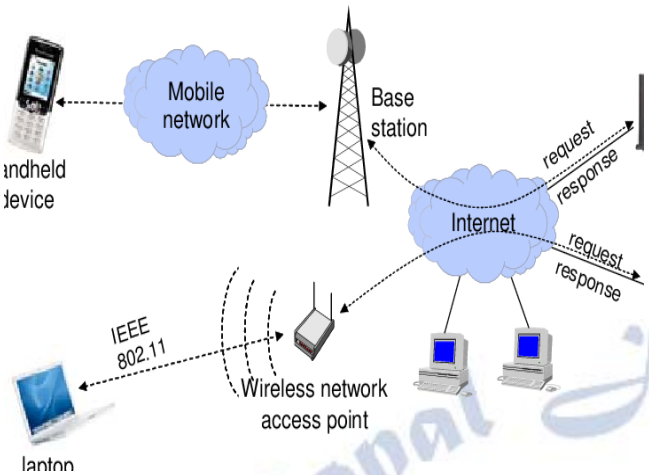

Fig 1: Architecture of Wireless Communication Systems

In architecture, In Cellular Communication Systems , the geographical area is divided in to several hexagonal shaped cells . The Cell tower is placed at the middle of the cell which provides radio waves to specified cell region users only. Beyond that range of the cell the user moves from one place to another or makes a call from one place to another place then, when a user comes to the edge of the cell region then another cell tower will request that particular user information in order to provide a service/network to particular user. But, the Present Mobile Station doesn't have the information about user so it makes a request to that particular user Mobile Station for user information.

The Mobile Station will send the user information to the Foreign Mobile Station through which the cell tower will gather the information of a user and provides the signal/network to user. The Process of Transferring user's information from One cell tower to another cell tower is known as "Hand – Off".

If a source from a cell wants to travel or makes a call to another cell region user then antenna receives the radio waves from air and transmitter will send that radio waves from one cell tower i.e., Sender's cell tower to the another cell tower on the other side of the cell tower receiver will receive the radio waves and transfer particular waves to specified user .

In architecture , the Source node sends a message to destination at the middle Dynamic particle Swarm Optimization (DPOS) algorithm keeps on monitoring the Pbest and gbest continuously and update the value of the node through Multiple Channel/Input , the Power Minimization and Energy Optimization is used to solve the solution to hard problems and data collection through relay node transfer to destination node by mitigating the Sound Noise Ratio (SNR) and Bit Error Rate the source can transfer the information to destination effectively .

To Create a Network there are 3 ways they are :-

1) Experiment :- To experiment the real network devices to make it realistic but sometimes it is impossible and also cost effective.

2) Mathematical Model :- In this Model by using graph models need to make assumptions.

3) Simulation :- Use Programming to represent devices .It is easy and economical can be easily verified. We use Simulation approach for project and for that the Ns2 software is used.

II. LITERATURE SURVEY

AliRamezani-Kebryaetal[11] tolerating each source-objective (S-D) pair is distributed an even channel, we plan the issue as a min-max per-move power minimization issue with least sign to-noise (SNR) guarantees. In the wake of showing that strong Lagrange duality holds for this non-bended issue, we change its Lagrange twofold issue to a semi-positive programming issue and get the ideal hand-misguided shaping vectors. We recognize that the ideal plan can be gotten in three cases, dependent upon the potential gains of the best twofold factors. These cases identify with whether the base SNR need at each S-D pair is met with equilibrium, and whether or not the power usage at a hand-off is the best among moves at optimality.

LucaSanguinetti etal [12] zeroed in on the force usage while satisfying particular nature of-organization necessities in a two-ricochet distinctive data various yield network with a single non-regenerative exchange is considered.

V. Havary-Nassab etal [13] depicted bar framing is considered for a distant association which contains a transmitter, a beneficiary, and move centers. For such an association, expecting that the second-demand bits of knowledge of the channel coefficients are open, we focus on two particular pillar shaping design moves close. As the essential technique, we plan the pillar previous through minimization of the total convey power subject to the beneficiary idea of organization

basic. We show that this system yields a shut construction plan. In the ensuing approach, the shaft shaping burdens are overcome enhancing the gatherer signal-to-uproar extent (SNR) dependent upon two unmistakable kinds of power necessities, specifically the full scale send power objective and individual exchange power limits.

Min Chen etal [14] depicted multiuser two-way move network where various arrangements of customers exchange information with the assistance of a hand-off center point, using balanced channels per pair. For a variety of two-way giving off instruments, for instance, decipher and-forward (DF), upgrade and-forward (AF) and pack and-forward (CF), we analyze the issue of preferably designating hand-off's power among the customer sets it assists with the ultimate objective that a self-self-assured weighted total speed of all customers is helped.

III. PROPOSED SYSTEM

The Rapid growth of the network transmission speed in day to day life to increment the exhibition of the innovation the examination organizations have taken the improvement of the 5G innovation. The 5G innovation is a high velocity data transmission technology which supports the fast information transmission, Energy efficiency and Resource utilization the network coverage area. The transmission pace of the 5G somewhere around 100 Gbps which is more limited than the 4G innovation. In network resources to allocate the resource effectively as well as the to optimize the energy in our proposed system Dynamic Particle Swarm Optimization (DPOS) algorithm [4,5].

Reduce Bit Error Rate. Overall Average end to end as well as routing overhead and throughput ratio is increased .

Compared to previous base paper method performance ,DPOS expands the energy productivity and asset assignment.

Load Balancing became easy by updating the fitness value as well as the position of the Particle.

3.1 DPOS Algorithm Explanation

Dynamic Particle Swarm Optimization algorithm (DPOS) is an extension of Molecule Swarm Optimization (POS) is fixed in size while in Dynamic Particle Swarm Optimization the size is considered dynamically.. In Particle Swarm Optimization is fixed in size while in Dynamic Particle Swarm Optimization the size is thought about progressively. The Particle is only an article which is populace based stochastic calculation and Swarm is a gathering of items that movement same way. The DPOS calculation is propelled by the bird relocation or fish tutoring based on the concept of the birds relocation this algorithm came in to existence . In which group of birds search for a food without knowing the particle place in an iteration manner . After, every iteration the objects will becomes closer to the said location.

3.2 Algorithm

The pseudo code of the DPOS Algorithm

For each element
Initialize function value
END
Calculate average Fitness value
Do
For each element
If Fitness value is less than average
Consider the element
Calculate Fitness value.
If the Fitness value is better than the best
Fitness value (p-best) in history
Set current value as the new p-best.
END
Choose the element with the best Fitness value of all the elements as the g-best
For each element
Calculate element velocity according to equation
V [ ]= V [ ] + C1 * rand ( ) * (P best [ ] –present [ ]) + C2 * rand ( ) * (g best [ ] – present [ ])
Update particle position according equation
Present [ ] = present [ ] +V [ ]
END
While maximum iterations or minimum errors criteria is not attained .

IV. MODULES

4.1 Internet Service Provider (ISP)

An ISP is an organization, for example, AT&T, Verizon, Comcast, or Spectrum that gives Internet admittance to organizations, families, and surprisingly portable clients. ISPs use fiber-optics, satellite, copper wire, and

different structures to give Internet admittance to its clients.

ISPs may likewise give programming bundles (like programs), email accounts, and an individual Web webpage or landing page. ISPs can have Web destinations for organizations and can likewise assemble the Web locales themselves. ISPs are completely associated with one another through network passages, public organization offices on the Internet spine[6] .

4.2 Gateways

A passage (Gateway) is an organization hub utilized in broadcast communications that interfaces two organizations with various transmission conventions together. Doors fill in as a section and leave point for an organization as all information should go through or speak with the entryway preceding being directed. The essential benefit of utilizing a door in close to home or venture situations is working on web availability into one gadget .All organizations have a limit that limits correspondence to gadgets that are straightforwardly associated with it. Because of this, assuming an organization needs to speak with gadgets, hubs or organizations outside of that limit, they require the usefulness of a door. The Gateway is a medium through which signal can be transferred from different base stations at a time. It acts as an intermediate medium or interface between the ISP and Base stations. The gateway used in mobile wireless communication systems is VOIP(Voice Over Internet Provider) through which voice, messages etc., can be transferred data efficiently between mobile users, tablets etc.[7],

4.3 Base Station

Cell towers (Base Stations) or cell destinations are the place where electric correspondences hardware and receiving wires are mounted, permitting the encompassing region to utilize remote specialized gadgets like phones and radios.

Cell towers are normally worked by a pinnacle organization or a remote transporter when they extend their organization inclusion or limit, giving a superior gathering signal around there.

4.4 Moving Node

A Moving Node is nothing but mobile user who moves or makes a call from one cell region to another cell region. If a mobile user becomes a moving node when user travels from one place to another place and by the process of hand – off process user can receive the signal automatically.

Without low network connectivity it can move from cell station to another cell station without any interruption . To achieve it we used the Dynamic Particle Swarm Optimization Problem (DPSO) algorithm is an extension of PSO algorithm in which the particle is nothing but an population or an object. By calculating continuous velocity of the node or user or population or object i.e., the fitness value of an object if fitness value of an object is less than 90dbm to 100 dbm then immediately whenever the moving node moves from one cell region to another cell region then, the present cell tower or base station requests its mobile station center (MSC) to provide the particular user details .

Then , immediately the Foreign Mobile Station Centre (MSC) makes a request to the origin Mobile Station Centre to send the details of the moving node which was present in that particular MSC while node is registered for a Sim then , the origin MSC will send the details of that particular user to the foreign MSC then from their the foreign MSC immediately forward the details of an user to the Base station after receiving the details of the particular user provides services to user.[8] All these process will be done in fraction of seconds but by using our algorithm due to continuous calculating of pbest and gbest and keeps on updating the position of the node in time.

V. METHODOLOGY

As seen from above algorithm it first initialize the Particle (Object or User) calculates the Fitness value continuously on the off chance that the wellness esteem is better compared to the pbest in history i.e., contrast with past esteem then we set current worth as the new pbest .

And furthermore this calculation computes the gbest an incentive for in general particles or clients among them it picks the best gbest esteem by looking at the pbest upsides of the relative multitude of particlesin the Swarm and select one value as gbest .

This algorithm calculates the Particle velocity for each iteration by using the velocity formula in which we consider Pbest (Population best) minus the Present value with the gbest(Global best) value minus present

whatever value we get as a result of velocity according to that value the particle will updated .

Based on that value, the particle position will also update from one cell tower to another cell tower by sending network from present cell region with the help of past cell tower or base station information from mobile station . The moving node is nothing but a mobile user who travels from one place to another place or who makes a call from one place to another place . Finally iterations keeps on going until the particle reaches the destination.

In this algorithm it won't allow Sound Noise Ratio [10]while transferring the information from one base station to another base station . The source will make a call or moves from one place to another the radio waves first of all got to base station and their the Antennas receive the waves and through transmitter it will send the information to the destination's base station in which receiver will receive the radio waves and forward those waves to the receiver.

The below table shows the sample parameters that considered conduct for dynamic PSO various parameters that acts as a elemnets in the network on which we apply various values by using different formulas .The set of such non dominated point gives us true Pareto front. The parameters which considered in the table shows that the earlier calculating of the values of the value of the element will overcome the problem of the energy efficiency and resource allocation .The result for this problem has shown in following figure.

TABLE 6.1 Benchmark Functions

Function	Objective Functions	D	Variable Bound
ZDT1	$f_1(x) = x_1$ $f_2(x) = g(x)(1-\sqrt{x_1/g(x)})$ $g(x) = 1+9(\sum_{i=2}^{D} x_i)/(D-1)$	6	[0,1]
ZDT2	$f_1(x) = x_1$ $f_2(x) = g(x)(1-(x_1/g(x))^2)$ $g(x) = 1+9(\sum_{i=2}^{D} x_i)/(D-1)$	6	[0,1]
ZDT3	$f_1(x) = x_1$ $f_2(x) = g(x)\left[1-\sqrt{x_1/g(x)}\right]$ $g(x) = 1+10(n-1)+\sum_{i=2}^{n}[x_i^2-10\cos(4\pi x_i)$	6	[0,1]

The arrangement of such non overwhelmed point gives us true Pareto front. The outcome for this issue has displayed in above figure. Problems ZDT1,2,3 were models. These issues can be scaled to two boundaries of goals and choice factors. We perform recreation to screen molecule conduct for dynamic PSO to apply for tackling various items advancement in 6 dimensional spaces.

VI. RESULTS AND DISCUSIONS

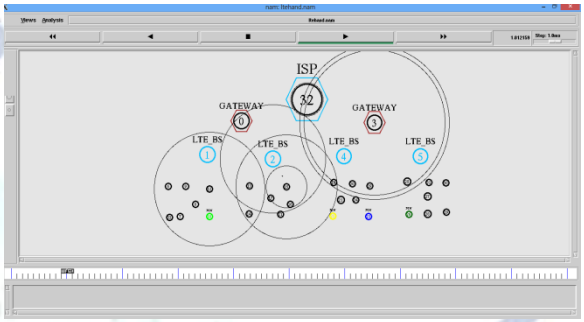

Fig 6.1: Network Animator

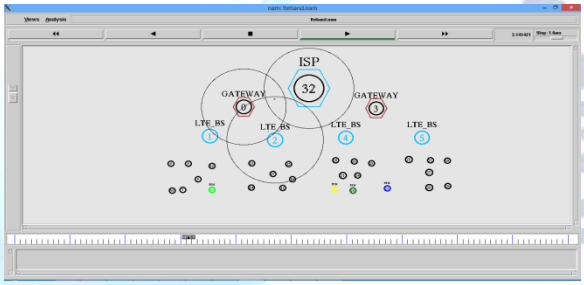

Fig6.2: Network Animator (MovingNodes)

X- Graph (PEFORMANCE GRAPH RESULT)

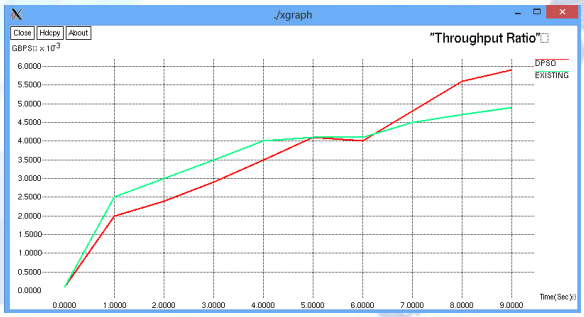

Fig6.3 : Throughtput Ratio

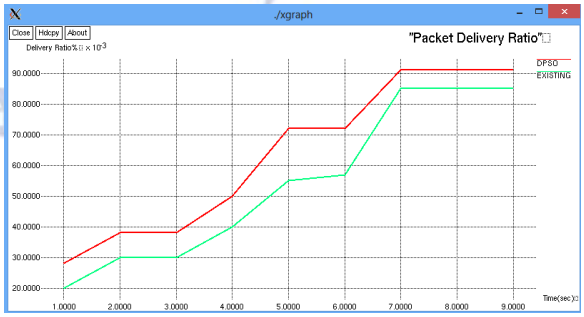

Fig 6.4 : Packet Delivery Ratio

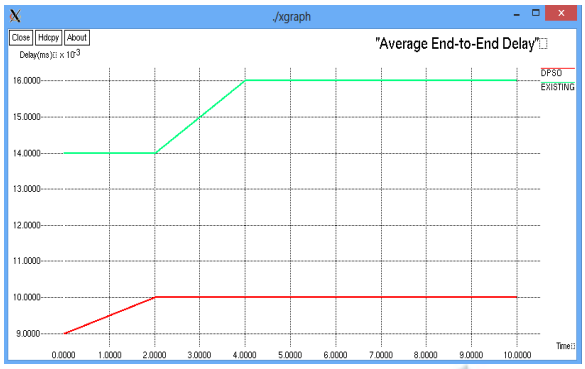

Fig 6.5: Average End to End Delay

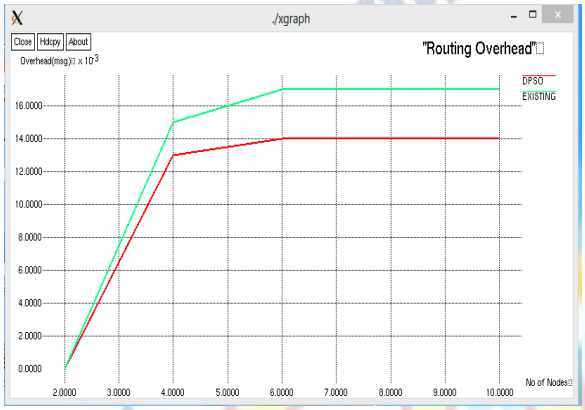

Fig 6.6 : Routing Overhead

VI. FUTURE SCOPE AND CONCLUSION

The outcomes gotshows that the Dynamic Particle Swarm Algorithm continuously gathers the information of the particles and allocate a best solution to them in a wireless communication systems when a particle network is within -90 dbm to -100 dbm. Energy efficiency is increased due to the effective calculation of the particle within time and also resource allocation problem is overcame by sending the information from one Cell tower to another cell tower by hands-off process through Mobile Station Centre (MSC) which contains information about a particle (or) user within the specified cell that can be transferred to cell tower within location and from that when an user travels from one place to another place there will be no network issues.

Automatically, the present Mobile Station Centre will send the information of user to the Foreign Mobile Station Centre from their the cell tower will receive the user information then the user will get network immediately from the cell tower.

Later on we can apply the proposed calculation in to different applications any place the answer for an issue is hard. We can likewise additionally further develop the energy proficiency and asset assignment issue in 5g innovation by Powerful Molecule Multitude Enhancement (DPOS) calculation.

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