Heterogeneous Cloud Radio Access Network

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Abstract—To reduce the several in between base station processing in heterogeneous network we connect all the heterogeneous Network with the main more powerful central server on cloud and in this way in this Network name is HCRAN, for reducing the cost and load in this paper we properly study existing system and then some problems that present in the previous Network reduce or eliminate in this Network ,like overloading ,Energy consumption, reduced in this Network but Throughput increased and dead nodes decreases in this Network .In this thesis paper we increases the overall performance of the HCRAN by using the base station shifting technique and changes the method of devices connected with the base-station in the previous HCRAN the devices connect with the base station according to the distance but in this paper the distance and energy factor considered for connection for improving the performance of system ,in this way by implementing this techniques in the HCRAN the energy consumption and overloading, main problems in the previous HCRAN resolves in this system. The overall work divided in three scenario in the first scenario the base stations shifting technique that is new technique shows in simulations results and in the second scenario the connection process between the base- stations and devices in system shows according to distance and energy factor and in the third scenario the overall work combined and shows the wake up situations after sleep and connection with the nearest base- station shows in this thesis paper.

Keywords—*Energy consumption, Throughput, No of calls drop, No of dead nodes etc*

I. INTRODUCTION

I. Heterogeneous Network: - A Heterogeneous is a word which means different this is the opposite of homogeneous word. The heterogeneous network is the network in which the   different computers that run on different operating like some on the windows and some on the Macintosh ,when connected with each other through the wired or wireless medium in network called heterogeneous network this not contain only computers also contains some another devices like mobile phones, Tablets ,etc. when the wireless LAN connect with the Wi-Fi cellular telephone system then the technology changes this network is also called heterogeneous network .in this way when the network contains two different technologies for communication called heterogeneous network .

I.I Heterogeneous Network Architecture:-From an architecture view ,the Heterogeneous network viewed with conventional macro radio access network functions, and in this way when the network designed in proper layout and through proper methods and use proper technology according to users need that is called Architecture of heterogeneous network .The heterogeneous network architecture has support the (SON) functionality means when the network support the self-optimization network functionality the network automatically tunes when condition changes and self-configuration reduces the cost and time that spent on the network .
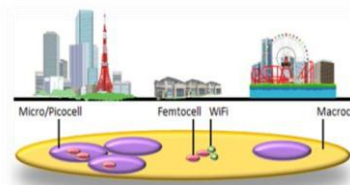

Figure 1. Architecture of HETNET

THE MAJOR ACTORS OF CLOUD COMPUTING SYSTEMS

Actor	Definition
Cloud Consumer	A person or organization that maintains a business relationship with, and uses service from, *Cloud Providers.*
Cloud Provider	A person, organization, or entity responsible for making a service available to interested parties.
Cloud Auditor	A party that can conduct independent assessment of cloud services, information system operations, performance and security of the cloud implementation.
Cloud Broker	An entity that manages the use, performance and delivery of cloud services, and negotiates relationships between *Cloud Providers* and *Cloud Consumers.*
Cloud Carrier	An intermediary that provides connectivity and transport of cloud services from *Cloud Providers* to *Cloud Consumers.*

II H-CRAN (Heterogeneous cloud radio access networks):-Heterogeneous cloud radio access network (HCRAN) is cost efficient solutions to eliminate the inter tier interference through combination of cloud computing .In this network the overall multiple antennas and some another processing devices on network connect with the high speed "signal processing cloud server" with the high speed optical fibres. In this way the processing that done on the base - stations in heterogeneous network move on the cloud server ,and in this way the baseband data path moved to the cloud server through this network the overall load decreases on the base-stations for processing and the operating expenses are lowered and energy consumption of the wireless infrastructure is mostly decreased .

The Major Actors of Cloud Computing System

II.I H-CRAN Challenges
* Development of a new BBU virtualization platform.
* Development of mechanisms to reduce the power consumption.
* Quality-of-service must be maintained.

In this research paper we improve the HCRAN system that currently exist using the techniques that increases overall performance of the system , This research work simulation results represent the energy consumption, no of dead nodes and no of calls block reduces and throughput of system increases when it compare with the existing system. The overall work is divided into the various sections in the first section is the **Section I (Introduction**) part in this part we describe the introduction of heterogeneous network means firstly what is heterogeneous network means the combinations of various devices that connected with each other through wires and support different platforms called heterogeneous network and then the architecture of heterogeneous network , and then when this overall network is connected with the main central cloud server than this system called heterogeneous cloud radio access network describes all this work in introduction section **Section II (Literature Review)** Then in second section the previous research papers and the research work related with our research work read like the some papers that represent in this section in which we read some algorithms like (ESTC) and some energy consumption reducing techniques uses in HCRAN and read and understand his work and then new technique design after gain some knowledge from previous work in this papers some related with mobile cloud computing and some related with arrangement of devices like we called topologies use in systems . **Section III (Problem Formulation**) After read and analyse the previous work and techniques that are uses in the previous HCRAN some problems faces that are present in existing system main problem is overloading all other problems related with this

like Energy consumption, less throughput, more no of calls drop and more no of dead nodes through overloading situation this some main critical problems that faces before this research work that mention in this section. **Section IV (Proposed Work)** In proposed work section of this article the problems solve that faces in current system and mention in the section III, All work is divided into three scenario and in first base station shifting techniques shows and in second distance and energy factor according connection and in third overall combined system and dead nodes wake up and connection shows in simulation in Mat lab work. **Section V (Results)** In this section basically all the results that produced in proposed work section in mat lab software and its parameters comparison with previous work shows in the forms of graphs and figures. **Section VI(Conclusion)** In this section the layout of new system and design describes and ask why it is better as compare to previous HCRAN and some problems that removes and reduced ask in it and basically the new research work describe in this section. SECTION VII (FUTURE SCOPE) in this section in future how we implement it and after technology changes time to time which type of maintenance performs in the system describes. And then in references we shows some published papers, journals that refers by us for this research work shows in proper format.

II. LITERATURE REVIEWS

Qing Xie [1] The devices that runs by the batteries the mobile cloud computing provide significant rule in for performance enhancement and save energy in mobile and all another battery contained devices .The task graphs represented the applications that are running on the mobile devices but this is not an easy task this is complicated in cloud computing environment. The scheduling problem involves the following tasks:(1) Finding the tasks to be offloaded onto the cloud (2) Scheduling the other remaining tasks (3) For executing the other tasks find out the frequencies (4) The tasks are scheduled on the cores In this way the precedence requirements and application complete time period are fulfil but the overall energy consumption is reduced. An algorithm is represented which performs minimal delay by done the migration of the tasks in between the local cores and cloud and simultaneously applying the dynamic voltage and frequency scaling technique.

Panda et.al in [2]In this paper the researcher concentrate on the energy consumption reduced in the system by using new algorithm that name is Energy saving task consolidation(ESTC) algorithm by using this technique the idleness of the resources recovered means the idle time of the resources manages in system in cloud computing by this algorithm all the resources time period properly scheduled and some resources not overloaded or some not in the idle state the for this idleness handling purpose the previous algorithm based on (ESTC) designed but this result compare

with previous algorithm results this provide more efficient results as compare to previous one for handling idleness of resources and total no of task completion.

GU et.al in [3]. The way of the network arrangement means the way of the nodes or we called computers and another device that are connected with each other by the wireless medium uses any topology for connections the type of network topology uses and the protocols that use for communication provide a significant rule on energy consumption in the wireless sensor network. All the sensing area is partitioned and nodes are spread in the area. For managing the energy consumption energy cost for each and every areas for every time period made nearly common. In this network inner cluster node competition is introduced. And for reducing the energy cost Multichip transmission between CH's is introduced so in this way the energy consumption is improved in the wireless sensor network.

Cheng et.al in [4] All in incoming jobs come in the or we called enter In the system that support cloud computing in random wise means not in serial order, and in this way the some nodes in the system work and some are wait in this way the throughput of this system is waste of energy . In this research paper the Energy saving task scheduling algorithm is enhanced this is based on the vacation queuing model in cloud computing. Firstly this algorithm used the vacation queuing model for the scheduling the task in HCRAN, secondly based on busy period state or busy cycle designed or we called proposed a task scheduling algorithm that is very better for reducing the energy consumption in HCRAN and for overall performance of the system.

Bartelt et.al in [5]   The backhaul connection is the connection that connect the overall network system with vast storage main server that situated on cloud in cloud computing environment , the connection is established through the high bandwidth , high speed optical fiber in wired medium and the technologies that use for connections and protocols that use for communication that's enhanced version all discussed in this paper ,backhaul can help for handling the future demands of mobile networks, in this paper researcher properly concentrate on the backhaul technologies and improvement of previous technologies .

III. PROBLEM FORMULATION

In an H-CRAN based system, the concept is to eliminate data processing on Base Stations and move it to a cloud environment to process it in a virtual BS. Also, the connection to cloud is an overhaul connection which solves the high data transmission rate problem. In the existing system, sometimes due to overload scenario, communication gets slower. In such scenario, we cannot communicate. Even in such scenario, we need to determine the priority

communication and allocate that even if that can cause a call drop etc... And in the previous heterogeneous network due to overload condition some time call drop, in this HCRAN system we eliminate it , in the existing system sender connect with receiver or called base station through distance comparison but in this system sender connect with base station through distance and energy label factor means for communication and shifting process needed energy that should be present in base station .I previous system energy consumption high as compare to proposed system we decrease energy consumption through handle high energy consumption devices or through decreasing load in network .over all existing system less efficient as compare to new HCRAN system through various factors like load balancing , Energy consumption, Throughput and speed, reliability some major problems of existing heterogeneous network eliminate in this HCRAN.

IV. PROPOSED WORK

In the proposed work we improve the previous HCRAN system, we eliminate the some major problems that faces by the users and while simulation done we find out all the major problems of existing system and some major problems eliminate or reduced in this system for increases the overall performance of the whole HCRAN like overloading, Energy consumption, priority communication, Throughput etc., and divide all the work in the Three scenario or we called steps like this:-

Step I

In this 1st scenario the there are no of nodes in the system, which contains all sender ,receiver ,base station etc. that are connected with each other through wired or wireless medium in this when sender connect with the nearest base station and the limit of base station load is set like in this system 0.8 and when the load of base station increases from this particular limit ,then sender automatically shift to another nearest base station but this all process is hidden from user but the call drop problem eliminate and this process also perform when high priority process come in system .

```
R=randint (1, 1, [1 200]);
Imshow (a)
S=randint (1, 1, [1 200]);
Imline (gca, [l(S, 2) l(R, 2)], [l(S, 1)
L(R, 1)])
Load=rand (1);
If (load>0.8)
R=randint (1, 1, [1 200]);
Pause (1)
Imline (gca, [l(S, 2) l(R, 2)], [l(S, 1)
l(R, 1)])

End
```

Step II

In this 2ⁿᵈ scenario we shows that in which way connection establishes between sender and receiver .In the previous network connection establishes but according to distance means which is nearest from particular sender connection establishes like any person call any another location person using cell phone the system connect his mobile with the nearest base station but some time the particular receiver in overloading situation then call block, in this system check distance and energy factor simultaneously means overloading condition occur or not when occur it find out another base station and when condition occur in between call then shifting process applied in HCRAN .

E (1:200, 1:200) =randint (200,200,
[1 10]);
W=d+E;
Imshow (a)
Wmin=min(W(S,1:n));
For I =1: n
if (W(S, i) ==Wmin)
R= i;
End
End
Imline (gca,[l(S, 2) l(R, 2)], [l(S, 1)
L(R, 1)])

Step III

In this 3ʳᵈ scenario we shows sleep node again come into working condition and then connect to the nearest communicating device ,because in this system for decreasing energy consumption we set particular value of energy consumption for each and every device and when its value of energy consume increases it automatically enter in sleep situation .And in this scenario we combine all the working of first two scenario and in this over all Throughput of network, No of call drops in system ,performance of network ,Energy consumptions, Dead nodes in previous HCRAN and proposed HCRAN compare with the help of graphs .

V. RESULTS AND DISCUSSION

Scenario I:- This is the overloading problem elimination system result ,all the green dots are the various nodes or we called devices in the vast heterogeneous network, and when sender connect to base station in HCRAN and in between when overloaded condition occur means value of sender increases from setting limit like in 0.8 in this Network then sender shift automatically to another base station and call not drop in between, this action perform when high priority sender come into the system then previous user shift in this Enhanced Network.
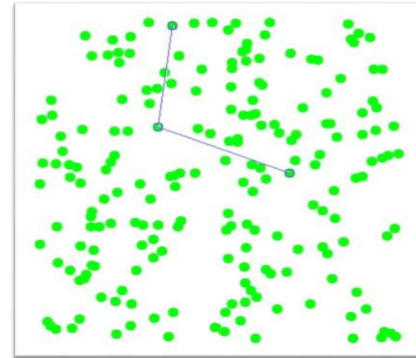

Figure 2. Base station shifting

Scenario II:- According to distance the sender connect with the base station the nearest base station find out according to the distance and energy factor in this system and then connection establishes and when overloading situation occur shifting process applied to the nearest base station.
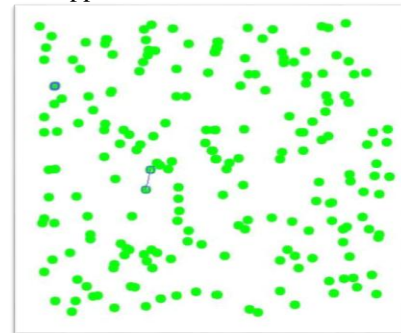

Figure 3. Distance according connecting and shifting

Scenario III: - In this scenario in the proposed HCRAN system for the purpose of energy efficiency the high energy consumption devices like when the energy consumption increases from the specified limit then that particular devices sleep for some time and then wake up and start his own working but this condition rarely occur because eliminate overloading condition in this proposed system .This system contain less dead nodes as compare to previous one.
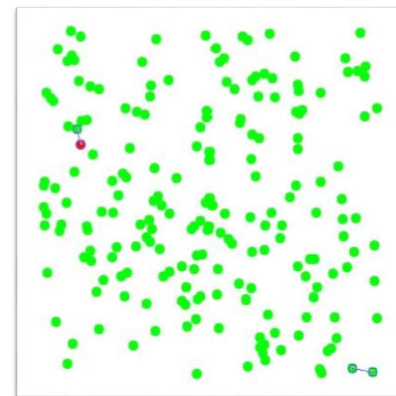

Figure 4. Dead node connecting and shifting

V.IV Energy consumption in HCRAN: -

In this graph the energy consumption of the existing HCRAN Network and the new network compared .This shows the existing system use more energy as compare to the proposed one, because overloading situation occurs in previous system,   because shifting process not present in existing network. In figure NHCRAN means new system and EHCRAN means existing system in all the figures.
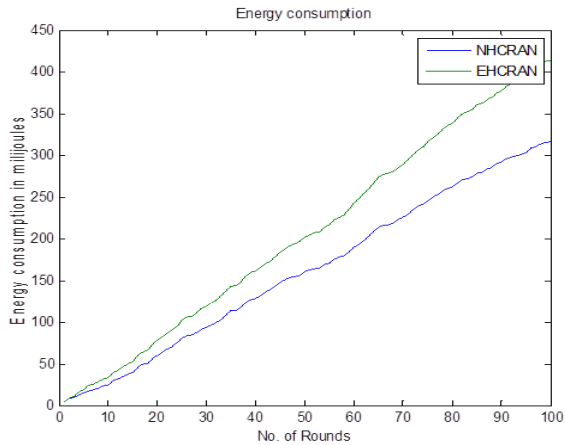

Figure 5. Graph representation of energy consumption of each round

V.V Dead Nodes in HCRAN:- When we compare the dead nodes in both systems the dead nodes more in the previous network as compare to New HCRAN system ,because when load increases on any device then its working slow because energy consumption increases and at end it dead ,but through shifting process it reduces.
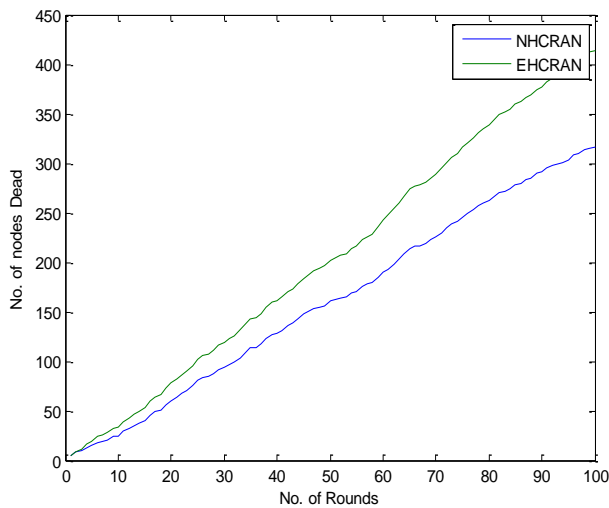

Figure 6. Graph representation of no of dead nodes for NHCRAN and EHCRAN

V.VI Calls Drop in HCRAN:- This graph shows the no of calls drop in the previous HCRAN system and the Proposed HCRAN system we seen in graph the no of calls drop in the previous system is more as compare to new system because

in previous system shifting mechanism not applied and receiver enter in overloaded condition and not any process present in system for handle priority calls ,but in this system overloading situation resolve by shifting mechanism that is why no of calls drop less as compare to previous HCRAN .
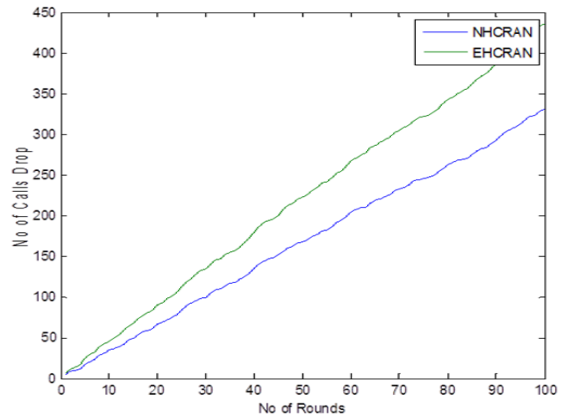

Figure 7. Graph representation no of calls drop in NHCRAN and EHCRAN

V.VII Throughput in HCRAN: - In this Graph we shows the Throughput of the two HCRAN systems when we compare the throughput of the New System with the existing HCRAN system the throughput of the enhanced system more as compare to the previous system because the overloading, no of dead nodes, no of calls drops and energy consumption decreases this is the main causes of Throughput Increases.
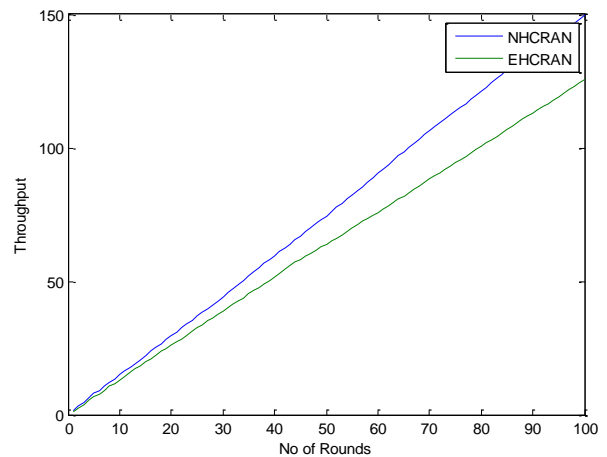

Figure 8. Graph representation Throughput of NHCRAN and EHCRAN

VI .CONCLUSION

In this Paper, an improved H-CRAN based system is introduced, which would be beneficial to eliminate data processing on Base Stations and move it to a cloud environment to process it in a virtual Base Stations. In the

existing system, sometimes due to overload scenario, communication gets slower. In such scenario, we cannot communicate. Even in such scenario. We present a system which detects priority communication using improved header and takes correct measure to allocate it if all the channels are busy. The new system is more efficient as it has less power consumption and has better efficiency due to which the number of dead nodes is decreased gradually. The results shows that there is about 35% fall in number of dead nodes due to which system more efficient and it has less energy consumption which is helpful for lifespan of system mainly for those systems which are working on Battery.

VII .FUTURE SCOPE

This system is better as compare to previous HCRAN and produce better results as compare to the current system in present time in future after this simulation results this implement physically in people but according to the technology change the maintenance done according to the users' needs by the developers done time by time and takes better results from this HCRAN and produces more efficient system. In this system we handle calls drop problem decreases no of dead nodes in system, reduces overloading by shifting mechanism, and reduces energy consumption in the network. In future we update base station shifting technique by changing overloading factor and distance according and energy factor according connection updates done time to time with technology changes.

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