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Novel approach for Energy-Efficient in Green Cellular Network Using Heterogeneous Network

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Abstract: *A distribute method to detect the energy efficiency of cellular networks can be developed meaningfully by selectively adapting off some of the Base Stations (BSs) during periods of low transportation load. During off-peak period where traffic weights are only a division of the peak-time traffic masses, a subset of BSs is convert off to reduce working energy consumption without disturbing service of network users. This formulation, however, requires a computationally challenging task as the population of the network grows. A message-passing algorithm develops for data clustering in data-mining techniques. The self-organization algorithm reduces the energy consumption by non- adaptively switching off-peak BSs with low computational costs. A propose green radio communication using the Message-Passing Algorithm. by non-adaptive technique; also use heterogeneous networks for energy consumption in green cellular networks.*

Keywords: *Green Radio Networks, Energy-Efficient Operation, Attraction Propagation, Message-Passing Algorithm and self-organization algorithm*

I. INTRODUCTION

Cellular network for mobile communications implement SDM. The figures of cells are always perfect circles or hexagons, but depend on the situation on weather conditions, and now and again even on system load. Typical systems using this approach are mobile telecommunication systems. A heterogeneous network is a network joining computers and other strategies with changed operating systems and protocols. The term heterogeneous is also used in wireless networks using different access knowledge. A wireless network which delivers a service to continue the service when changing to a cellular network is called a wireless heterogeneous network. the topic introduces because of increasing alertness of the potential harmful effects to the atmosphere caused by CO_2 releases and the reduction of non-renewable energy sources, it is more critical than always to come together to advance more energy-efficient systems. A telecommunication system is not an exception. From the cost-effective take of cellular network operators, it is also important because a significant portion of their operational expenditure drives to pay the power bill. For instance, it is estimated that cellular network. Up to 60- 80% of the complete energy used up in wireless communications has been revealed related to base station (BS) operations.

Numerous approaches have been proposed to recognize energy efficient BS processes. Basic information that the energy was saves by turn-off a subset of BSs when they are not in use. Their approach is called dynamic BS operation or dynamic BS switching. In commercial cellular networks, BSs are densely deployed to guarantee a minimum service-level-agreement (SLA) during peak traffic periods. Their typically result in a large under-utilization of BSs during off-peak periods, contributing to unnecessary energy consumption. The use of previous information related to daily traffic profiles can contribute to a more precise control of the dynamic BS operation, thereby leading to significant energy savings. In a distributed BS switching strategy, which would work even in the absence of the traffic information, is proposed.

Some educations address the road traffic transfer concept between adjacent cells through the dynamic process of BSs. When a fixed of BSs is switched off, the other fixed of active BSs in its place serves road traffic loads that were before connected with the switched-off BSs operating coverage cooperating procedures, e.g., cell zooming, self-organizing algorithm (SOA), and load balancing. Self-Organizing algorithm- SOA explanations can be divided into three classifications: Self-Configuration, Self-Optimization and Self-Healing.

SELF-CONFIGURATION- The eNB will by himself constitute the Physical Cell Character, communication frequency and power, leading to earlier cell planning and rollout.

SELF-OPTIMISATION–It contains optimization of coverage, capacity, handover and interference. Flexibility load balancing (FLB) is a meaning where cells suffering congestion can handover load to other cells, which have spare resources. FLB contains load reporting between eNBs to conversation of data about load level and available capacity.

SELF-HEALING- Structures for automatic recognition and deletion of failures and automatic alteration of parameters are mainly identified in Release 10. Coverage and Capability Optimization supports automatic modification of capacity problems conditional on slowly changing situation, like seasonal differences.

To reduce Energy-Efficient in Green Cellular Network using a message passing algorithm, Self-Organizing algorithm and creating a Heterogeneous network. In a message passing algorithm used backhaul technique to send a message from one BS to another BS. Using Self-Organizing algorithm to increase the power capacity, coverage, handover, interference and Physical Cell Character, communication frequency & Structures used for automatic recognition and deletion of failures. Flexibility load balancing (FLB) is a meaning where cells suffering congestion can handover load to other cells. Heterogeneous network used for increase the sensing range and detecting range in different cell. All these techniques used for saving maximum energy-efficient.

II. LITERATURE REVIEW

Framework for Green Radio (GR) research participate important link that are currently distributed. According to Y. Chen et.al [2] four important tradeoffs establish in the skeleton of the framework. In everyday systems, the tradeoff relatives regularly diverge from the simple monotonic curves derived from Shannon's formula, most of the current literature mostly focused on the point-to-point single cell case. The visions, such as how to progress the tradeoff curves as a complete and how to tune the process point on the curve to balance the specific system requirements, was estimated to guide the practical system designs towards green evolution; the proposed framework impact the green design of future systems.

The phases of electricity ingestion used in communication networks, containing of telecom operator networks. In telecom operator networks, S. Lambert et.al [3] designed a three quarters of the total ingestion, they used a top-down method based on an illustrative operator sample to obtain a high degree of assurance in their results.

E. Oh et.al [4] they focused on green cellular process. Using real data traces, derived a first-order calculation of the percentage of power saving one can assume by turning off base stations during low traffic times while maintaining coverage. They also current and discussed a number of appropriate challenges and solutions, maintaining coverage, enabling cooperation between operators, and providing E911 service.

H. Zhang et.al [5] they proposed A three scalable BS switch-off designs to reduce the power ingestion of cellular networks during off peak hours and used BS support to powerfully spread out the network handling to the package areas of the switched off cells. They Definite the QoS in those switched-off cells by attention on the worst-case broadcast locations instead of calculating three-dimensional averages. they derived closed form languages for the outage probability for the considered BS switch-off patterns and assistance modes and calculated the expected power saving. Mostly possible up to 50% power saving was observed in numerical results.

M. Ismail et.al [6] they designed Network cooperation for energy saving on two scales: Large scale: networks with overlapped coverage consecutively switch their BSs according to long-term traffic load fluctuations - Small scale: active BSs switch its channels according to temporary traffic load fluctuations. Satisfactory service quality in terms of call blocking and large one hundredth of energy saving, confirm radio coverage. Service quality constraints can be extended to: minimum achieved quantity for data applications and delay and delay-jitter for video streaming applications Experienced cost: synchronization overhead require.

The difficulties of BS switch for energy savings in wireless cellular networks. A designed attitude based on the newly presented concept of network-impact. K. Son et.al [7] they proposed several SWES algorithms. Additionally, their proposed algorithms are designed to be online Message-Passing Algorithm. s that could be operated without any centralized controller. Finally, from the first-order analysis they showed the amount of energy saving in need of upon the road traffic ratio of mean and modification and the BS deployment. They empirically showed that the proposed simple algorithms can not only perform close to the optimal exhaustive algorithm but also they can achieve significant energy savings up to 80%.

Y. S. Soh et.al [8] investigated the design of energy efficient cellular networks through the service of base station sleep mode plans as well as small cells, and considered the tradeoff issues associated with these techniques. Future work may include the addition of the above model to the case where base stations have various antennas and may complete principle user choice. It would also be attention to explore how random spatial situations of base stations that model repulsion or hang-up affect the results in terms of quantity and energy efficiency. To finish, the energy efficiency metric studied here is only depend on the power ingestion and the coverage within the network, and does not take into account the infrastructure cost and backhaul overhead associated with implementing small cell networks.

The developed an imaginary (and also practical) framework for BS energy saving that contains both dynamic BS operation and user association. They definitely formulated a total cost minimization problem that allows for flexible tradeoff in the medium of flow-level presentation and energy ingestion. According to K. Son

et.al [9] Numerical results based on the developed real BS topologies under practical formations showed that the proposed energy-efficient user association and BS operation algorithms can theatrically reduce the total energy consumption by up to 70-80%, conditional on the appearance rate of traffic and its spatial circulation as well as the density of BS deployment.

III. PROBLEM DEFINITION

Consider a cell group involving of N BSs and U operators. All BSs are of a standardized category with related energy ingestion designs and indexed from BS 1 over BS N. Moreover, all users display similar regular traffic demands. Since the total traffic difficulties can be categorized by the number of active users, the system can make an estimation of the maximum number of compulsory active BSs. In addition, BSs can interconnect with adjacent BSs through the backhaul. Problem with improvement in technology, the rehabilitation techniques has vast development in future. Investigates are going on to develop regular, low charge and easy to procedure devices. Out of all the rehabilitation techniques, heterogeneous network are the latest and most effective techniques. Researches in these fields are being carried out extensively. The heterogeneous network distribution based on small computer, Pico and femto cells can be used to complete this goal. Since thinking radio and difficult relaying are acknowledge future technologies in this regard, we propose an investigation vision to make these knowledge more energy efficient.

In the existing system will introduce a heterogeneous network for BSs and user association for maximum energy-saving management in green cellular networks. Message-passing algorithm similar to attraction propagation which is develop for data clustering and allows a fully distribute operation. It is a very efficient solution for realizing energy-saving network with low computational costs.

IV. METHODOLOGY

Message-passing algorithms that can be employ to produce an energy-efficient network using a message-passing (MP) background. Once the network enters an off-peak period, it classifies the best network conformation that reduces the total energy consumption, while preserving the minimum data rate requirements for separate users, i.e., in a distributed method, converting each BS on or off and reconfiguring the matching user association. In maximum cases, the network can make an evaluation of the regular traffic loads during daily off-peak periods based on traffic statistics that have been develop in a long time. Then, the network can control an energy-saving strategy by restrictive the total number of active BSs that are compulsory to operate during the off-peak periods to maximize energy-saving increases. The self-organization algorithm and overall procedure support this trying network association. The important contributions of this paper are summarized

Energy-saving user association: An accurate model for self-organizing process to realize green radio communications. To switch the task, a combinatorial optimization- created construction is established to target at the minimization of the energy ingestion in cellular networks. The objective function is the complete energy ingestion of the network that is the sum of the energy ingestion compulsory to guarantee different user services and the working energy ingestion of active BSs. The energy ingestion of active BSs to continue basic operations is displayed as the sum of constant stand-by energy ingestion and additional energy-consuming properties in proportion to the number of users that the BS serves concurrently. The success of this objective controls the cellular network by absorbed the operational load on a subset of the BSs and simultaneously offloading the operating burden of heavily-loaded BSs to lightly-loaded active BSs.

Message-passing algorithm : A Message-Passing Algorithm. to efficiently invention the best network conformation that minimizes the overall energy ingestion of the wireless cellular network by implementing an MP background based on attraction propagation (AP), which is a message-passing algorithm develop for data clustering in data-mining procedures. While used in numerous disciplines, such as arithmetic physics and computer science, successful submissions of this method in wireless cellular networks have been incomplete to a few early everything. The attractiveness of this approach is that the algorithm is naturally distributed. The distributed environment of the algorithm breaks down the combinatorial optimization into a conventional of many optimization tasks without harming the optimality of the solution, and the computational process can thus be distributed over separate nodes.

Heterogeneous networks: Heterogeneous network used for increase the sensing range and detecting range in different cell.Heterogeneous networks can be valuable in load matching as well as energy saving by deciding to separate load for load matching and to concentrate load for energy savings. The advantages of methods such as cell zooming also contain improved user knowledge such as improved quantity and increased battery life. With procedures such as BS cooperation and communicating, inter-cell interference and fading effects can be moderated and hence mobile units can detect higher variety gains and improved coverage.

However, satisfactory challenges lay ahead to basically realize these networks such as radio frequency development, organizing switching thresholds, evading coverage holes, sketching spatial and historical traffic load oscillations.

Green Protocol: In green protocol calculate all the result by using flowing step- The self-organization technique is defined four steps: original user camping-on, message-passing, final user suggestion, and energy-efficient communications. These obviously reveal that the self-organization algorithm can be seamlessly surrounded in commercial cellular networks. For comfort of understanding, we discuss this issue in the context of commercial 3GPPLTE network.

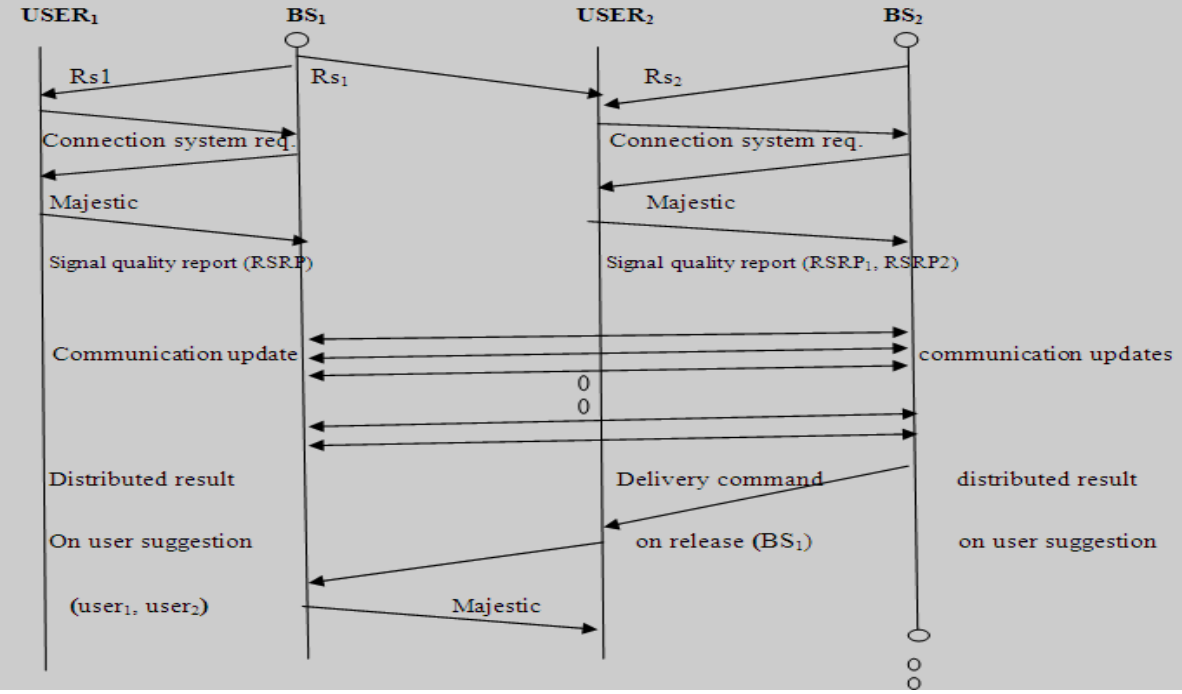

Fig- Self-organizing procedures of the green cellular networks using message-passing algorithm.

Procedure:-

Fig. shows represent a synopsis of the self-organizing procedure using the Message Passing algorithm in green cellular networks. For effortlessness, only two BSs and two users are drawn. The technique is classified into two steps, where the self-organization algorithm is surrounded in the second steps. The operation details in each step are as

Follows:-

STEP 1 (Initial Camping-On): BSs sometimes broadcast their specific reference signals (RSs). Users may receive multiple RSs from neighboring BSs. Upon treatment of the RSs, users measure the signal quality and choose the best BS, which is normally the nearest BS. Then, request-grant commands exchanged in a handshake manner establish radio resource control (RRC) connections between user-BS pairs. Once RRC networks are established, users report the signal quality of the RSs from their adjacent BSs in the form of received signal received power (RSRP). In our example, user 1 and user 2 are committed to their nearest BSs, i.e., BS 1 and BS 2, respectively. User 2 reports both RSRP1 and RSRP2 to BS 2 because BS 1 is a neighbor of user 2.

STEP 2 (Message-Passing): Each BS now has basic network information regarding its connected users through STEP 1. Based on the RSRP values, all of the costs required for connecting its user to candidate BSs, i.e., Pia, can be produced and stored in each BS. Since each user is permitted to establish a data connection to a single BS in 3GPP-LTE, each BS is responsible for updating and exchanging all messages, including BS messages and user messages that are associated with it in Algorithm 1. Messages are exchanged through the backhaul which involves some practical issues, such as control signaling overhead and latency. Messages-passing are repeated until all messages come together or until the maximum number of iterations is reached

V. CONCLUSION

For saving maximum energy in green cellular networks Use Message-Passing Algorithm. and Heterogeneous networks. It is a very efficient solution for energy-saving with low computational charge and environmental effects.

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