Reducing Communication Overhead By Using Traffic Load Balancing Frame Work

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Abstract— *Dramatic mobile data traffic growth has spurred a dense deployment of small cell base stations (SCBSs). Small cells enhance the spectrum efficiency and thus enlarge the capacity of mobile networks. Although SCBSs consume much less power than macro BSs (MBSs) do, the overall power consumption of a large number of SCBSs is phenomenal. As the energy harvesting technology advances, base stations (BSs) can be powered by green energy to alleviate the on-grid power consumption. For mobile networks with high BS density, traffic load balancing is critical in order to exploit the capacity of SCBSs. To fully utilize harvested energy, it is desirable to incorporate the green energy utilization as a performance metric in traffic load balancing strategies. In this paper, we have proposed a traffic load balancing framework that strives a balance between network utilities, e.g., the average traffic delivery latency, and the green energy utilization. Various properties of the proposed framework have been derived. Leveraging the software-defined radio access network architecture, the proposed scheme is implemented as a virtually distributed algorithm, which significantly reduces the communication overheads between users and BSs. The simulation results show that the proposed traffic load balancing framework enables an adjustable trade-off between the on-grid power consumption and the average traffic delivery latency, and saves a considerable amount of on-grid power, e.g., 30%, at a cost of only a small increase, e.g., 8%, of the average traffic delivery latency.*

I. INTRODUCTION

Proliferation of wireless devices and bandwidth greedy applications drive the exponential growth of mobile data traffic that leads to a continuous surge in capacity demands across mobile networks. Heterogeneous network (HetNet) is one of the key technologies for enhancing mobile network capacity to satisfy the capacity demands In HetNet, low-power base stations referred to as small cell base stations (SCBSs) are densely deployed to enhance the spectrum efficiency of the network and thus increase the network capacity. Owing to the disparate transmit powers and base station (BS) capabilities, traditional user association metrics such as the signal-to interference-plus-noise ratio (SINR) and the receivedsignalstrength-indication (RSSI) may lead to a severe traffic loadimbalance. Hence, user association algorithms should be well designed to balance traffic loads and thus to fully exploit the capacity potential of HetNet.In order to maximize network utilities, balancing traffic loads requires coordination among BSs. The dense deployment of BSs in HetNet increases the difficulty on coordinating BSs.To address this issue, softwaredefine radio access network (SoftRAN) architecture has been proposed. SoftRAN enablescoordinated radio resource management in the centralized control plane with a global view of network resources and traffic loads. The user association algorithm leveraging the SoftRAN architecture is desired for future mobile networkswith an extremely dense BS deployment. Owing to the direct impact of greenhouse gases on the earth environment and the climate change, the energy consumption of Information and Communications Technology (ICT) is becoming an environmental and thus social and economic issue. Mobile networks are among the major energy hoggers of communication networks, and their contributions to the global energy consumption increase rapidly. Therefore, greening mobile networks is crucial to reducingthe carbon footprints of ICT. Although SCBSs consume less power than macro BSs(MBSs), the number of SCBSs will be orders of magnitudelarger than that of MBSs for a wide scale network deployment.Hence, the overall power consumption of such a large number of SCBSs will be phenomenal.Greening HetNets have thus attracted tremendous research efforts.

II. FEASIBILITY STUDY

Feasibility study was an evaluation of a proposed designed to determine the difficulties in carrying out a designed task. Technical and system feasibility study Technical feasibility is carried out to determine whether the company/developer has the capability to do the project in terms of hardware, software, personnel and expertise to

handle the completion of project. So my project uses eclipse tool and MySQL database, those are freely available in internet. propose a research vision to make these technologies more energy efficient.

Economic feasibility study
It's for evaluation the effectiveness of the new system, more commonly known as cost benefit analysis which is to identify the cost and benefit factors which can be categorized as development cost and operating cost.

Operational feasibility study
It commonly describes how well the proposed system solves the problem.

Schedule feasibility study
Schedule feasibility study normally describe the how long time it will take to complete the project. Which is mostly depends on the experience of person who has to develop the project.

III. PROBLEM STATEMENT:

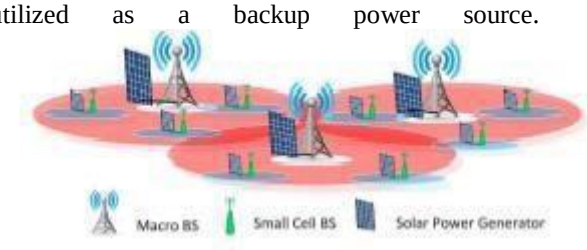
More information exchange or communication between user and base station on air interface for user association is not efficient one. It will produce some traffic to network. Green energy is utilized secondly when on grid energy is low or not enough. By utilizing green energy as primary source reduce computation and cost.

IV. EXISTING SYSTEM:

Existing system uses on grid energy as primary source and use grid energy when on grid energy is not available such as not enough or low or energy consumption exceed limit. Green energy reduces resource cost and on grid power consumption involves some traffic load but it is utilized as optional. It runs user association algorithm in real devices which will increase information exchange between user and base station and result in extra communication cost and power. It increases on grid power consumption and traffic delivery latency.

V. PROPOSED SYSTEM:

Hybrid energy source system obtains energy from different sources but we mainly optimize the system to use green energy as primary source and on grid energy used when needed. It will reduce cost of power requirement and traffic loads of base station consuming on grid power. This scheme runs the user association optimization in the RANC, and thus significantly reduces the communication overhead over the air interface. We virtualize user and base station, they will perform calculation of user association algorithm beside of user and base station respectively based on previously collected data. Radio Access Network Controller will use these result and make decision about association. Green energy is utilized to reduce the on-grid power consumption and thus reduce the CO2 emissions while on-grid power is utilized as a backup power source.



VI. MODULES:

A. Initial Phase

The first phase is the initial user association and network measurement, during which the RANC collects network information, e.g., available green energy, traffic loads, and users' data rates.

B. User Association Phase

Based on the collected network information, the RANC optimizes the user association. In order to efficiently optimize the user association, the vGALA scheme divides the user association algorithm into two parts: the user side algorithm and the BS side algorithm.

C. User Side Algorithm

The user side algorithm calculates the user's BS selection. We define the time interval between two consecutive BS selection updates as a time slot. At the beginning of the K-th time slot, vBSs send their operation statuses to virtual users. Upon receiving vBSs' operation status updates, virtual users select vBSs according to the user side algorithm.

D. BS Side Algorithm

The BS side algorithm updates the BS's operation status calculated based on the green traffic capacity and the traffic loads. These data are broadcasted to all virtual users via RANC. The user side algorithm runs on virtual users while the BS side algorithm runs on vBSs. In this way, instead of exchanging information over the air interface, the virtual users and vBSs can iteratively update their information locally within the RANC. Here, the virtualization only virtualizes the computation resources for BSs and users rather than virtualizing all their functions.

E. Optimality of vGALA

In determining the user association, the vGALA scheme strives for a balance between the green energy utilization and the network performance. Additional information exchange over air interface between user and base station

are reduced by virtualized user and base station.
n this paper, we propose a virtually distributed user association scheme that leverages the SoftRAN concept. We generate virtual users and virtual BSs (vBSs) in the radio access networks controller (RANC) to emulate a distributed user association solution that requires iterative user association adjustments between users and BSs. This scheme runs the user association optimization in the RANC, and thus significantly reduces the communication overhead over the air interface. In this scheme, users report their downlink data rates calculated based on perceived SINRs via an associating BS to the RANC where traffic loads from individual users and BSs are measured. The RANC optimizes the BS operation status that reflects the price for a user to access a BS. The user association is determined by the BS operation status and the users' downlink data rates. The proposed scheme, in determining user association, allows an adaptable trade-off between network utilities, e.g., the average traffic delivery latency and the green energy utilization. Meanwhile, running the user association within the RANC avoids leaking energy information to users. As a result, users have no obvious incentives to counterfeit reports. Based on the above features, we name the proposed user association scheme as vGALA: virtualized Green energy Aware and Latency Aware user association 1.

VII. VGALA: A GREEN ENERGY AND LATENCY AWARE LOAD BALANCING SCHEME

In this section, we present the vGALA scheme and prove its properties. The vGALA scheme generally consists of three phases. The first phase is the initial user association and network measurement, during which the RANC collects network information, e.g., available green energy, traffic loads, and users' data rates. The second phase is the user association optimization, in which the RANC optimizes the user association and derives the corresponding BSs' operation statuses based on the information collected in the first phase. Here, a BS's operation status reflects the price for a user to access the BS. In the third phase, the user association is determined based on the optimized BSs' operation statuses and users' downlink data rates. The major optimization of the vGALA scheme is in the second phase. To be analytically tractable, we assume that (1) the RANC can successfully collect the network information from all BSs and users, and (2) the users' data rates do not change within one user association process. We will evaluate these assumptions in the next section where we discuss the practicality of the vGALA scheme.

VIII. CONCLUSION

We have proposed a traffic load balancing frame work referred to as vGALA. The vGALA scheme includes both the user side algorithm and the BS side algorithm. To avoid the extra communication overheads, the vGALA scheme, by leveraging the SoftRAN architecture, introduces virtual users and vBSs to simulate the interactions between users and BSs, thus significantly reducing the information exchanges over the air interface. The extensive simulation results have validated the performance and the practicality of the vGALA scheme.

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