Efficient Channel Utilisation in Ultra Dense Networks

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***Abstract*- In 5G networks where Internet of Things (IoT) is a key player, low cost security is inevitable. Physical Layer Security (PLS) stems as an important and effective solution.PLS signifies the attempt to achieve information-theoretic security in digital communication system by exploiting the randomness in the transmission media. Investigate the inherent high secrecy capacity of UDN which plays a key role in providing highly secured connectivity. Provides a guaranteed average secrecy rate in the case of active eavesdropping while in the case of passive eavesdropping it provides statistical characterization of the performance of secrecy communication in UDN. Specifically, one can gain insights of how the secrecy performance in UDN scales with the density of various network nodes, namely the legitimate user, the eavesdropper and the BSs.**

***Index Terms*—5G, physical layer security, small cell ,UDN, legitimate user**

I. INTRODUCTION

The global mobile communication industry is growing rapidly. Today there are already more than 4 billion mobile phone subscribers worldwide more than half the entire population of the planet. Obviously, this growth is accompanied by an increased energy consumption of mobile networks. Global warming and heightened concerns for the environment of the planet require a special focus on the energy efficiency of these systems. The earth is a concerted effort to achieve this goal and as part of its objectives, holistic frameworks developed to evaluate and compare the energy efficiency of several design approaches of wireless cellular communication networks. For the quantification of energy savings in wireless networks, the power consumption of the entire system needs to be captured and an appropriate energy efficiency evaluation framework is to be defined. The EARTH E3F presented the key levers to facilitate the assessment of the overall energy efficiency of cellular networks over a whole country.

The E3F primarily builds on well-established methodology for radio network performance evaluation developed in 3GPP; the most important addendums, it are to add a sophisticated power model of the base stations as well as a large-scale long-term traffic model extension to existing 3GPPtraffic scenarios. The energy efficiency of LTE is compared to that of already deployed networks is discussed and targets for the energy efficiency of future wireless networks are given.

II. SYSTEM MODEL

Energy-efficient green cellular networks have become a hot research topic nowadays to deal with the dramatically increasing energy consumption of cellular infrastructure. As one of the key features of 5G networks, the energy-efficient design is valued by operators from both the environmental and economic viewpoints. For cellular networks, BSs are dominant in energy consumption and consume around 60-80% of the total network energy. The objective of this project is to seize the opportunity of tracking the traffic variation in the temporal and spatial domains of the network to adapt the radio resource allocation accordingly such that a great amount of energy can be saved.

As one of the most popular and efficient energy saving schemes, BS sleeping has a great potential in energy saving when the traffic load is low. The following figure illustrates several simple BS sleeping patterns. Besides traffic active BSs. Second, traffic-aware sleeping makes both the topology of active BSs and the interference scenarios change. So new frequency reuses pattern, scheduling, and power control schemes should be developed accordingly.-aware BS sleeping, there are also new technical problems that need to be addressed and will be studied in this project.

In order to provide a true real time service for media stream transmission, multicast with patching stream scheme has been proposed in, which operates as follows. In response to the first user's request, the transmitter delivers the requested media stream using multicast transmission. Late user that submits a new request for the same media stream will immediately join the multicast group and receive the ongoing multicast media stream, buffering the data received. Meanwhile, the fraction of the media stream that has been already transmitted in the multicast media stream before this user's request will be delivered with uncast transmission.

However, in these patching multicast schemes, the system bandwidth is always assumed to be unlimited and thus no request will be refused due to sufficient bandwidth, which is unreasonable in wireless communication networks. Fur-

there more, in these schemes the transmission bandwidth for each media stream is also assumed fixed which will cause the serious wastage of transmission power due to the under-utilization of system bandwidth.

III. SOFTWARE TOOL

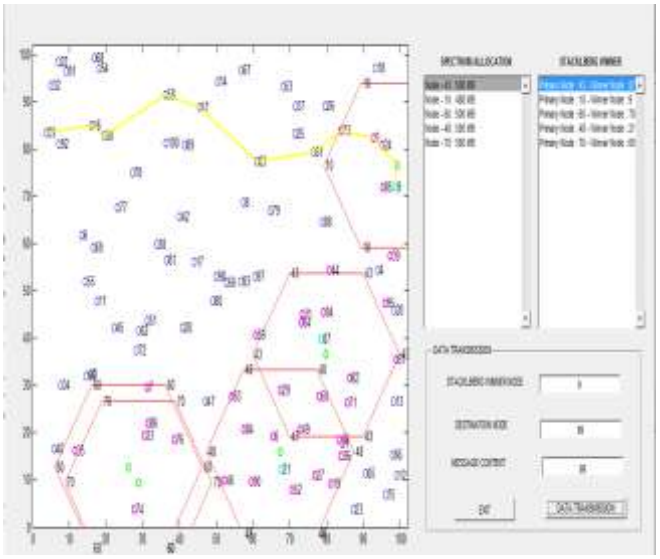
MATLAB (Matrix Laboratory) is a special-purpose computer program optimized to perform engineering and scientific calculations. It is a high-performance language for technical computing. It integrates computation, visualization, and programming in an easy-to-use environment where problems and solutions are expressed in familiar mathematical notation.

- Typical uses include:
- Math and computation
- Algorithm development
- Modeling, simulation and prototyping
- Data analysis, exploration and visualization
- Scientific and engineering graphics
- Application development, including Graphical User Interface building

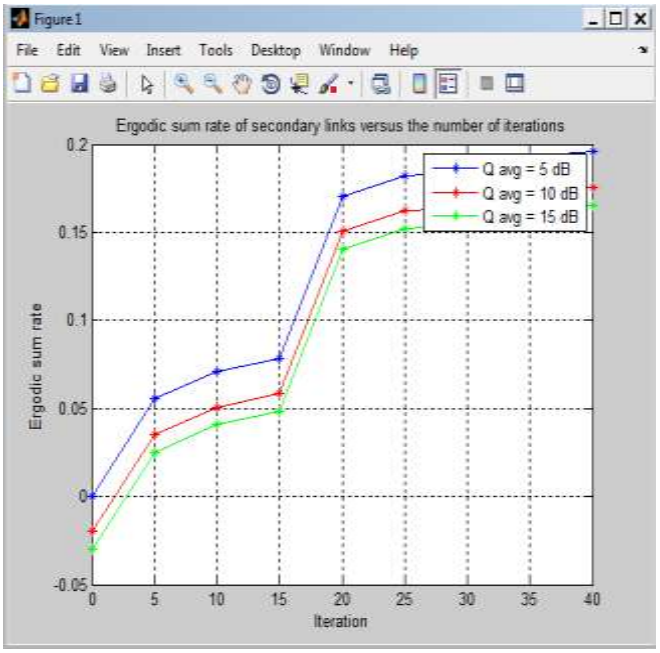
IV. PROPAGATION MODEL

In this examination, we consider the downlink of a UDN included little cell BSs which transmit at a power Ps. We use a standard propagation model with a way misfortune ($\alpha > 2$) where they got flag influence at a separation d from a BS is $Pd^{-\alpha}$. The little scale channel blurring considered in this letter represents the key properties of UDNs, where LOS proliferation is generally plausible. In this manner, we expect that the fundamental connection between the honest to goodness clients furthermore, the BSs is displayed as a Rician channel with a parameter Km. Besides, we display the spillage interface he speaking to the channel between the Eves and the transmitting BS with another Rician blurring channel with a parameter Ke.

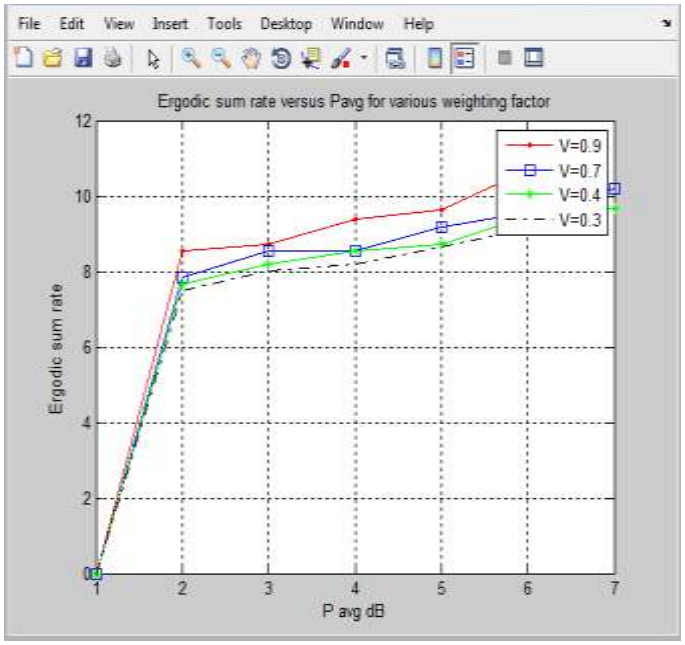
The propagation modeling is a vital part of the investigation of wireless communication problems. Since the network densification brings the access point closer to the users, the LOS transmission components become most probable. Hence the study of dense networks requires a different propagation model where the LOS transmission is considered. Also, in dense indoor networks, the cells are deployed in buildings with many floors, thus a three-dimensional propagation environment should be considered. This suggests two major modifications to the traditional propagation modeling in macro cellular networks; the consideration of dual-slope or multi-slope path loss model while the path loss exponent becomes a function of the distance to the user, and employing Rician fading channel instead of the simple Rayleigh fading model. In order to acquire accurate modeling for the propagation environment in dense networks, the consideration of dual-slope or multi-slope becomes inevitable. Another open research heading in the investigation of thick systems is the thought of 3D channel displaying. Additionally, the thought of multi-incline way misfortune models requires facilitate examination in various densification settings. The displaying of channel blurring to represent the engendering qualities in UDN proposes the utilization of Rician blurring model which requires assist thorough examination.



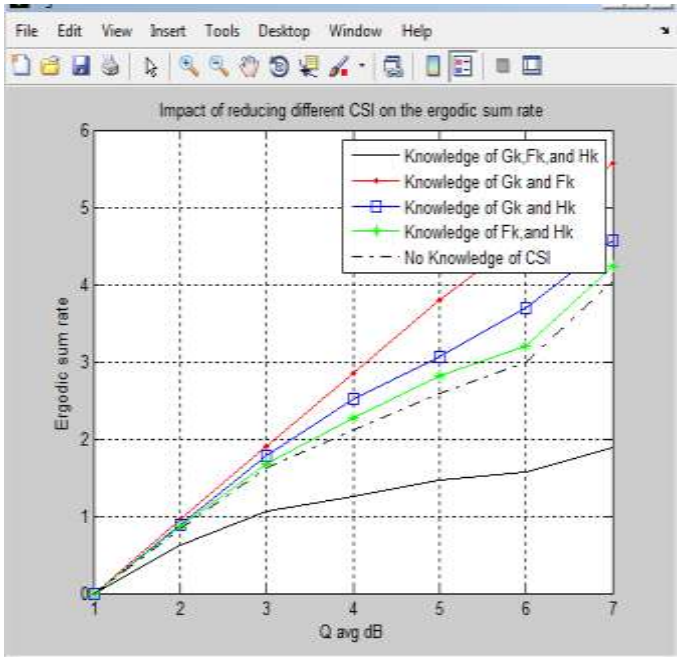
Data is transmitted to successful node



Statistical characteristics between the ergodic sum rate & iteration



Statistical characteristics between the ergodic sum rate & power avg



Statistical characteristics between the ergodic sum rate & Q-factor

V. CONCLUSION

Heterogeneous ultra-dense networks fuse various technologies including ultra-dense small cells, massive MIMO and mm Wave. The unique features of such network architecture provide physical layer security, caching, and wireless energy harvesting with new opportunities. We have illustrated the benefits of using physical layer security, caching, and wireless energy harvesting in heterogeneous ultra-dense networks, and identified technical challenges, respectively. Since security, content services, and energy are of paramount importance (e.g., 5G service requirements), the new solutions introduced by this article can help engineers form the basis of efficient future networks. The heterogeneous degree of large scale user behavior and presented closed-form formulas that establish the quantitative relationship between large-scale user behavior and energy-efficient UDN configuration. In addition, proposed three energy-efficient control strategies of micro BSs for the special case that the traffic demands and/or the size of hotspot regions are much lower than those of the non-hotspot regions. Simulation results validate the theoretical analysis and demonstrate that the proposed control strategies can potentially lead to significant improvement of UDN EE. These theoretical results can be used to determine the density, the transmit power and the control strategies of BSs for UDNs to achieve optimal EE. The possible extensions of this work could include multiple antennas, bandwidth allocation and interference cancelation.

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