INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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SHORT ABSTRACT

With the advancement in technology, the demand for wireless data is growing explosively over years. The unprecedented rise in demand for higher data rates is attributed to factors such as an increase in the number of mobile applications, alarming growth in bandwidth-needy applications like video streaming, and the use of multiple devices by the same user. This has resulted in a push for an investigation of new architecture and technologies to satisfy the ever increasing demands and requirements of the wireless networks. Data-based applications have gained immense popularity as a necessity in our day-to-day life. In order to connect the growing number of wireless devices, resources are reused in the cellular system. In the traditional cellular wireless network, the cellular user equipment (UE) communicates its data to the base station (BS) using uplink (UL) network resources. Similarly, the data at the BS is communicated to the cellular UE on employing downlink (DL) network resources. However, if the transmitting and receiving UEs are in close proximity to one another, the BS can allow with control/limited control the UEs to directly communicate with each other. This direct communication mode between the transmitting and receiving UEs is referred as the device-to-device (D2D) communications. The introduction of D2D communication in cellular wireless networks provides advantage in terms of proximity gain at crowded arenas like shopping places, carnivals and festivals, and office buildings. Thus, transmission is achieved with high data rate, lesser delays, and less power consumption. In underlaying D2D mode, the cellular resources are reused by D2D links and achieve a reuse gain as one of the advantages of D2D communications. D2D communication underlying cellular network offers an advantage in terms of improved spectral efficiency but at the cost of increase in interference due to sharing of resour. The main challenge in allowing links using the same resources for the cellular DL or UL transmissions is the mutual interference between the D2D and cellular links. In order to manage the mutual interference an interference cancellation (IC) strategy is presented which considers orthogonal precoding vectors for links sharing the same resources. This IC strategy improves the outage probability and the overall capacity of cellular and D2D UEs sharing the same resources