An Energy Efficient D2D Communication Model with Guaranteed QoS for Cloud Radio Access Networks

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Abstract

This work proposes a spectrum selection scheme and a transmit power minimization scheme for a device-to-device (D2D) network cross-laid with a cloud radio access network (CRAN). The D2D communications are allowed as an overlay to the CRAN as well as in the unlicensed industrial, scientific and medical radio (ISM) band. A link distance based spectrum selection scheme is proposed and closed-form approximations are derived for the link distance thresholds to select the operating band of the D2D users. Furthermore, analytical expressions are derived to calculate the minimum required transmit power to achieve a guaranteed level of quality of service in each operating band. The results demonstrate that the proposed scheme achieves nearly 50% power saving compared to a monolithic (purely overlay or purely ISM band) D2D network. Moreover, this work creates an immense space for communication technologies to be wisely managed and utilized by application layer requirements through CRAN architecture. Caching strategies for content replication across end user devices and effective content delivery strategies can be implemented for forthcoming video streaming applications.

Keywords:
cloud radio access networks, device-to-device communication, , overlay communication, proactive caching, underlay communication.

Declaration

I declare that this is my own work and this thesis does not incorporate without acknowledgement any material previously submitted for a Degree or Diploma in any other University or institute of higher learning and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

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The above candidate has carried out research for the Masters thesis under my supervision.

Signature of the supervisor

Date

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