

Enhancing Spectral-Energy Efficiency for LTE-Advanced Heterogeneous Networks: A Users Social Pattern Perspective

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Abstract:

The development of Long-Term-Evolution (LTE)- advanced and beyond cellular networks is expected to offer considerably higher data rates than the existing 3rd generation (3G) networks. Among the many potential technologies in LTE-Advanced systems, users' characteristics and social behavior have been studied to improve the networks' performance. In this paper we present the concept of user social pattern (USP), which characterizes the general user behavior, pattern and rules of a group of users as a social manner, and utilize USP as an optimization basis for network performance enhancement. From large-scale traffic traces collected from current mobile cellular networks, the USP model is evaluated and testified. Furthermore to evaluate the potential of spectral-efficiency (SE) and energy efficiency (EE) enhancement based on USP in LTE-A HetNet networks, we establish a complete system and link level HetNet simulation platform according to 3GPP LTE-A standards. Then based on the platform, simulations are performed to evaluate the impact of USP on SE and EE in LTE-A network, and a user social pattern based spectral efficiency and energy efficiency enhancement scheme is proposed for heterogeneous network of the LTE-A system. Simulation results validate that the users social pattern (USP) can be used as an effective concept for network performance optimization in LTE-A system.