

**ENERGY-EFFICIENT D2D OVERLAYING
COMMUNICATIONS WITH SPECTRUM-POWER
TRADING**

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ABSTRACT

- In this paper, we investigate device-to-device (D2D) overlaying communications with spectrum-power trading where D2D users (DUs) consume transmit power to relay cell-edge cellular users (CUs) for uplink transmission in exchange for bandwidth from CUs for D2D communications. The proposed spectrum-power trading aims at exploiting individual disparities from both the spectrum and the power perspectives.
- Recently, energy efficiency (EE) defined by the ratio of the data rate to the power consumption has become increasingly important for devices due to their limited capacity batteries. As such, our goal is to maximize the weighted sum EE (WSEE) of DUs via a joint D2D relay selection, bandwidth allocation, and power allocation while guaranteeing the quality of service (QoS) of each CU. Specifically, we study WSEE maximization problems for two different cases, i.e., public-interest DUs and self-interest DUs, depending on whether the DUs are willing to share their obtained bandwidth with each other or not.



CONT...

- For the case of public-interest DUs, we show that for a given D2D relay selection, the objective function of the WSEE maximization problem in a fractional form can be transformed into a subtractive-form that is more tractable based on the fractional programming theory.
- To perform D2D relay selection, we first reveal a fundamental relationship between the WSEE and other two EE metrics, i.e., system-centric EE and fairness-centric EE, which has never been found in the existing works to our best knowledge. Based on this insight, the D2D relay selection problem can be cast into a minimum weighted bipartite matching problem. For the case of self-interest DUs, we show that the corresponding problem can be also solved with optimality by the algorithm proposed for the previous case. Simulation results demonstrate the effectiveness of the proposed algorithm.

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EXISTING SYSTEM

However, for CUs that are far away from their home base station (BS), the channel conditions are generally severely degraded and direct uplink transmissions to the BS incur an exceedingly high energy consumption, which would heavily affect the user experience and satisfaction due to the capacity limited batteries of handheld devices.

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PROPOSED SYSTEM

The proposed spectrum-power trading between DUs and CUs is mainly motivated by the following two observations. For an uplink transmission, the transmit power consumption instead of bandwidth is the performance limiting factor for CUs that are far away from the BS since they generally operate at low signal-to-noise ratio (SNR) Regimes.

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HARDWARE REQUIREMENTS

- Processor - Pentium-IV
- Speed - 1.1 Ghz
- RAM - 256MB(min)
- Hard Disk - 20 GB
- Key Board - Standard Windows Keyboard
- Mouse - Two or Three Button Mouse
- Monitor - SVGA

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SOFTWARE REQUIREMENTS

- Tool - Network Simulator-2
- Operating system - LINUX
- Front end - OTCL (Object Oriented Tool Command Language)

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