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Entitled

ENERGY-AWARE RESOURCE CONTROL FOR DUAL CONNECTIVITY DEVICES RUNNING MULTIPATH TCP

By

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Abstract

The introduction of multipath TCP (MPTCP) allows uninterrupted data transmission through different wireless interfaces simultaneously. It surpasses the performance and reliability of conventional TCP. Alternatively, the advent of software-defined networking (SDN) has revolutionized traditional network management and control by introducing significant changes. It enables the networks to be programmed through a centralized controller that oversees the entire network. Despite that, energy consumption is a remarkable issue when using dual-connectivity wireless devices, most of which are battery-powered. This thesis work primarily investigates the energy value differences of devices under different congestion control algorithms by using different interfaces such as WiFi alone, LTE alone and both interfaces together.

Furthermore, the study proposes an algorithm to choose the least energy consumed combination with the addition of software-defined networking (SDN) paradigm. Then, a tuning algorithm using deep neural networking (DNN) is also developed to fine-tune the result into the most accurate version. A real hardware setup with networks of various radio access technologies is used to experimentally assess the algorithm's effectiveness. This research shows that incorporating SDN and neural networks can lower the energy consumption of dual-homed wireless devices. Thus, the efficacy of the proposed algorithms has been confirmed through comprehensive hardware testing.

Keywords: Multipath TCP, software-defined networking, energy consumption, neural networks, congestion control, WiFi, LTE, multihoming