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Semi-persistent packet scheduling with fairness awareness for LTE downlink

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To support the increasing demand for multiple QoS classes and prevent from starvation of low-priority traffic in LTE (Long Term Evolution) systems, this paper presents a semi-persistent packet scheduling algorithm with fairness awareness (SPSF). With the proposed SPSF scheme, all traffics are categorized into GBR (Guaranteed bit-rate) and non-GBR according to their individual resource types. To improve the spectral efficiency in data, GBR traffic can be re-assigned RBs only at the beginning of a predefined multiple of frames (a frame = 10 TTIs), while non-GBR traffic can be re-assigned RBs which remain unmasked after GBR's RB allocation during each TTI (Transmission Time Interval). Besides, in order to avoid low priority starvation due to QoS provisioning, the proposed SPSF scheme can allocate each UE initially with its minimum bandwidth requirement in priority-level order under considering both spectral efficiency and resource sharing fairness. We derive the minimum bandwidth requirement for GBR traffic in terms of its arrival rate, queue length, and packet delay budget, while that for non-GBR traffic is expressed in term of its arrival rate, queue length, and packet loss ratio. We evaluate the performance of the proposed SPSF algorithm via extensive simulations on LTE-Sim by varying the number of UE's in the system. The performance metrics include the fairness index, user throughput, packet loss ratio, and packet delay for each class. Compared to the previously-proposed schedulers, the superiority and effectiveness of our proposed SPSF algorithm are demonstrated since the SPSF scheme is not only semi-persistent but also fairness-aware.

Biography

Yan-Jing Wu received PhD degree in Computer Engineering from the Department of Electrical Engineering, National Sun Yat-sen University, Kaohsiung, Taiwan. She became an Assistant Professor in 2007 and an Associate Professor in 2013 at the Department of Information Technology and Communication, Shih Chien University, Kaohsiung Campus, Taiwan. Her research interests are in the area of wireless communication networks, with emphasis on resource allocation and mobility management for multimedia traffic.

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