Research on the problem of resource allocation for the user plane in 5G mobile networks

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Abstract: This study investigates resource allocation strategies for the user plane in 5G mobile networks, addressing the critical challenge of efficiently distributing limited radio resources among diverse services with stringent latency, reliability, and throughput requirements. Focusing on the dynamic nature of enhanced Mobile Broadband (eMBB), Ultra-Reliable Low-Latency Communications (URLLC), and massive Machine-Type Communications (mMTC), we propose a novel scheduling framework that leverages network slicing and real-time channel state information. The proposed algorithm employs a hybrid approach, combining proportional fairness with latency-aware preemptive mechanisms to optimize resource block assignment while minimizing service degradation. Simulation results demonstrate that the framework significantly improves overall system throughput and reduces packet loss for URLLC traffic compared to conventional round-robin and max-throughput methods. Furthermore, the scheme maintains robust performance under high-load conditions, ensuring quality of service (QoS) guarantees across heterogeneous user demands. These findings contribute to the development of efficient, scalable resource management solutions essential for the operational deployment of 5G networks.

Keywords: 5G, resource allocation, user plane, mobile network