Context-aware Scheduling in Radio Access Networks *

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Abstract

In upcoming radio access networks, one flat IP network will deliver voice, data, and multimedia applications. Providing these services at the same layer leads to highly heterogeneous traffic. Most of this traffic can wait without service degradation but real-time data needs to be transmitted immediately.
To cope with such heterogeneous traffic requirements, quality-of-service differentiation is necessary. However, existing approaches for such a quality-of-service differentiation did – for multiple reasons – not yet gain widespread adoption.
We propose a new approach for quality-of-service differentiation in access networks, which is especially suited for mobile radio access networks.
We introduce a transaction-based framework to describe and transport context information from the user to the base station. A transaction stands for all traffic between the user's request until its completion.
It includes control information on the QoS requirements, the transaction's size, as well as other context features. While current schedulers operate on rate-dependent Utility functions, we describe the Utility of a transaction as a function of the transaction finish time.
The advantage of working with transaction finish times is that this metric is directly observable by the user. By using the transaction size, the scheduler can now plan the resource allocation for some Transmission Time Intervals (TTIs) into the future. This "planning ahead" provides performance gains compared to schedulers that focus only on the next TTI.

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