Quality of Service (QoS) Provisioning for uplink IP transmission
Serving Heterogeneous Radio Access Networks (CN7 Diplom)

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Motivation:
As more and more wireless access techniques are developed and started in market, mobile operators often have more than one type of access network and would like them to share existing transmission infrastructures as much as possible to reduce cost, for example, to let the Radio Access Network (RAN) of traditional GSM and the latest WiMAX [1] system to share the same transmission resource. This becomes possible in case of a pure IP transmission network where the voice/data streams from GSM BTSs will be re-encapsulated in IP packets and transmitted to uplink together with the IP packets from WiMAX Access Points (APs). The challenge is that, since the benefit of this IP transmission comes from its multiplexing of different types of traffics and therefore increase the bandwidth utilization, there is no more bandwidth over-provisioning, how to match the different QoS requirements of different traffics especially the voice in IP packets?

Project Description:

1. Design simplified traffic models for GSM and WiMAX traffic streams, and find their different QoS requirements parameters (packet delay, packet loss ratio, etc).
2. Propose a proper QoS provisioning mechanism (queueing, scheduling) for the combined IP transmission for the uplink direction to satisfy the QoS requirements of the traffic model. Some well-known queues include First-In-First-Out, Random-Early-Detection queues, and they are often used together with schedulers like Round Robin (RR), Weighted Round Robin (WRR) and Strict Priority (SP) schedulers.
3. Implement a simulator or a test-bed with the facility in WINGLAB to evaluate the performance of the proposed QoS mechanism and compare it with the case of no/simplest QoS schemes, i.e., one FIFO queue without any scheduler.

* This is a project in cooperate with Ericsson Telebit in Århus.
* A concise review of QoS concept and QoS provisioning approaches with queuing and scheduling can be found in [2].

References