Design and Investigation of a Realization of Explicit Congestion Notification (ECN) in Mobile Networks

Methods
Simulation

Topics
Wireless access networks

With the introduction of the iPhone in 2008 the traffic in the mobile Internet grew all at once to five times the amount. Since then the Internet traffic in mobile networks is increasing more and more. In 2010 to 2015 a growth of 92% per year is expected [Image Source: Cisco Visual Networking Index]. Unfortunately the capacity in mobile networks is limited and cannot just be upgraded as in fixed networks. Also new technologies like LTE cannot face such a strong growth in traffic.

A base station in a mobile network cell is responsible to decide which data should be transmitted at which point of time (scheduling). If too much data need to be transmitted and/or the transmission channel is poor, the data will queue up in the base station. In the worst case the buffer will overflow and data get lost.

The Internet Protocol (IP) is used to transmit data in the Internet, and also in the mobile Internet. IP provides a mechanism to announce a high buffer load in a network node. Usually, a sender will try, based on this signal, to reduce its sending rate before data get lost. This mechanism is called Explicit Congestion Notification (ECN). To use ECN a mechanism in a network node is needed to decide about the right moment to signal congestion. Those mechanism are usually based on the queue length (Active Queue Management, AQM).

Task description
In this project a new mechanism should be developed to use ECN in a base station. The decision about the congestion signal should not only depend on the queue length of the buffer but also on the scheduling scheme used and information about the channel transmission conditions. The developed algorithm should be investigated based on the simulation library of the IKR (SimLib).

Requirements
Programming Experience in Java

Desirable knowledge
Communication Networks I
Communication Networks II

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