TOM++ - Estimating One-Way Delay in Wireless Mesh Networks

Wireless mesh networks is a relatively new concept that is being developed for, amongst other things, providing Internet access to rural areas. They are cheaper because no physical connections between the routers are needed and thus also easier to deploy. However, wireless links are slower and more unstable than wired network links, which is especially notable when streaming media such as Voice Over IP or movies. This can be improved with routing protocols should be able to find a path which minimizes packet delay and schedulers that can prioritize packets that have been in the wireless mesh network too long. For such a routing protocol to work, the delay a packet experiences in the network has to be monitored.

To solve this problem this thesis presents TOM++, an improved implementation of the Tool for One-way delay Measurement (TOM). The improvements take queuing time and channel switching into consideration when performing one-way delay measurements in a multi-radio, multi-channel wireless mesh network based on Net-X. This has been accomplished by approximation of the sending time of packets in the transmission queue at each intermediate node. TOM++ has been tested and evaluated on the KAUMesh testbed, and this resulted in an increase of approximately 5% in the one-way delay measurement accuracy. A prototype of a Kalman filter has been implemented to see if it can be used to predict the approximation error of the sending time. No results for the Kalman filter prototype is presented in this thesis, but suggestions on further development are.