**Exposé**

**Congestion Control for Haptic Communication**

Tactile Internet requires stringent latency while the data rates vary drastically, traditional approaches not fulfill the QoS and the bandwidth utilization requirement, for example, Google Congestion Control (GCC)[1] can reduce the congestion of the network mainly for video streaming processing, but haptic stream still may not meet the latency demand. The algorithm CoDel[2] queue management setting latency limits for network packets in the buffer, overcome buffer bloat and improving the overall performance of the random early detection (RED[3]) algorithm. However, it lacks of competence to handle different data type flow flexibly, also difficult to meet different QoS requirements.

Therefore, a dynamic and network-aware resource management strategy will be design with satisfying the QoS requirement while without wasting precious bandwidth. Reference the methodological design in article[4], by setting up virtual queues in the protocol independent switch architecture (PISA) network, in which different priorities are provided for different traffic streams to meet the requirements of the network. In anticipation, this method guarantees both high utilization by virtual queue and low latency by traffic priority.

The task of this thesis is to design, implement and evaluate a specially configured PISA network, which should meet the requirements of tactile internet. The thesis will include the following aspects:

* Review of state of the art algorithms and approaches.
* Sketching out the solution approach with virtual queue and different traffic priority.
* Implementation the approach in ns3 using bmv2 switch.
* Modify and adjust the implementation according to the simulation results.
* The model performance comparison to the CoDel model.
* Evaluation of the model.
* Summarization and overview.

This thesis is written in English. As for the timeline, I'm leaning towards three weeks for each of the above steps, with the rest of the time to complete the paper and presentation work.

[1] Carlucci G, De Cicco L, Holmer S, et al. Analysis and design of the google congestion control for web real-time communication (WebRTC)[C]//Proceedings of the 7th International Conference on Multimedia Systems. 2016: 1-12.

[2] Kundel R, Blendin J, Viernickel T, et al. P4-CoDel: Active queue management in programmable data planes[C]//2018 IEEE Conference on Network Function Virtualization and Software Defined Networks (NFV-SDN). IEEE, 2018: 1-4

[3] Floyd S, Jacobson V. Random early detection gateways for congestion avoidance[J]. IEEE/ACM Transactions on networking, 1993, 1(4): 397-413.

[4] Lhamo O, Nguyen G T, Fitzek F H P. Virtual Queues for QoS Compliance of Haptic Data Streams in Teleoperation[J]. 2022.