

Master's Thesis

Synchronization and Signal Detection in Wireless Communications: A Deep Learning Approach

High-speed mobility conditions pose a significant challenge for any sort of wireless communication. For enabling the future of IoT and autonomous driving in vehicular environments, various standards have been developed by IEEE and 3GPP. Despite their existence, the current implementations are unable to achieve high-throughput reliable connectivity with extremely low latency. All of these issues come down to limitations of the proposed receiver design that is incapable of estimating and detecting the instantaneously changing channel conditions encountered during mobility at high speeds and through urban environments.

In this thesis, we propose the use of supervised machine learning to perform synchronization and signal detection for IEEE 802.11p. Our design aims to find methods that reduce complexity and offer an alternative solution that can perform better if not at the same level as the state-of-the-art methods. A fair comparison will be performed via bit-error rate simulation of traditional signal-detection methods against our ML model under previously collected real channel measurements from a high-speed mobility scenario.

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