ABSTRACT

This bachelor thesis consider future super-dense networks. We proposes header detection technique for coded random access (CRA) in wireless super-dense networks, which is expected to be important in the fifth generations (5G) telecommunications in 2020. This thesis consider CRA as a multiple access scheme that keep low computational complexity of detection, where header detection is of significant importance.

This thesis uses cross-correlation-based technique and Hadamard codes resulting simple matrix supporting low latency communications. This thesis also use *capture effect* algorithm to improve detection performances when multiple devices transmitting at the same time-slot. This technique is expected to improve correctly received packets (throughput) and also increase number of devices served in wireless super-dense networks. Potential application of this research is Internet-of-things (IoT), the structure of which is wireless networks with high density. The proposed header detection technique is evaluated based on parameters, e.g., throughput, signal-to-noise ratio (SNR), extrinsic information transfer (EXIT) chart, and packet-loss rate (PLR).

The contributions of this thesis are very significant because errors in header detection may affect and propagate to all decoding process in wireless super-dense networks. The results are expected to be useful for future wireless IoT networks.

Keywords: *Internet of Things*, *super-dense networks*, *header detection*, *coded random access*.