

## ABSTRACT

This thesis proposes Luby Transform (LT) network coding scheme for wireless Internet-of-Things (IoT) super-dense network with massive number of nodes and packets. This thesis is motivated by the required new protocol as an alternative to the existing network protocol, where retransmission is usually required for the lost or error packets. The proposed LT-like network coding, further called LTL-NC, does not need retransmission for the erased packets because the destination can still recover the packets from other packets received later in random time-slots.

LT codes as network coding in this thesis is selected due to its low computational complexity and adaptability to decode random arrival packets. LTL-NC also has low computational complexity because it operates only using eXclusive OR (XOR) to encode and decode. Since LTL-NC LT codes also has error correction capability, the network structure will have the ability of error correction when it is applied to the networks.

Performances in this thesis are evaluated under frequency-flat Rayleigh fading channels and binary erasure channel (BEC). The LTL-NC is also evaluated via different network topologies to evaluate the effect of the number of node, called simple network and complex network. The results from this thesis are on the evaluation of packet loss rate (PLR), throughput and extrinsic information transfer (EXIT) chart obtained from computer simulations.

This thesis also compares the proposed network algorithm to the existing network algorithm of transfer control protocol/ internet protocol (TCP/IP) with the same number of packets and the time-slots. The performances are evaluated using computer simulations with large numbers of samples to ensures the validity of networks evaluations, where LTL-NC shows higher throughput in a given network traffic.

Keywords: Network coding, LT codes, TCP/IP, Wireless, IoT, Super-dense Network.