

## ABSTRACT

This thesis proposes a network structure that forms single parity check network coding (SPC-NC) utilizing iterative spatial demapper (ISM) to reduce the number of time-slots in relay-assisted multi-source to single-destination wireless network communications. To reduce the number of time-slot channels, this paper proposes the use of superposition signals sent simultaneously by two separate sources. This paper uses ISM at the destination to separate the information of two users that have merged. This problem is quite difficult because it is similar to solving an equation having two variables.

To protect against errors, this thesis uses repetition codes as channel coding and utilizes relays to improve signal quality so that order-2 diversity can be achieved. All simulations in this thesis are carried out in MATLAB with parameters adjusted to practical conditions in real-field.

This thesis successfully simulated SPC-NC and found that combining two users into one time-slot can be performed with ISM, so that the total time-slot can be reduced. This thesis also found that SPC-NC with a relay with amplify-and-forward (AF) protocol can support two users transmitting at the same time. The performance of SPC-NC is good because the network connections can resemble SPC codes, such that an additional gain can be obtained. The results of this thesis are expected to contribute to the development of network coding in the future.

**Keywords:** single parity check, network coding, iterative spatial demapper, minimum time-slot