ABSTRACT

The increase of container number at the harbor indirectly causes severe multi-path fading effects due to the reflection of large number of metals. This undergraduate thesis proposes (i) harbor channel model and (ii) simple channel coding for wireless communication systems suitable to the harbor channel model.

The harbor channel model is derived using the New York University Wireless Simulator (NYUSIM) software, while the proposed channel coding is based on repetition codes with iterative decoding assisted by a doped accumulator (ACC). Channel coding is designed using the Extrinsic Information Transfer (EXIT) chart and is evaluated using a series of computer simulations in terms of Bit Error Rate (BER) and Frame Error Rate (FER) performances followed by outage performances. This thesis uses Orthogonal Frequency Division Multiplexing (OFDM) with cyclic-prefix (CP). The modulation proposed in this thesis is a non-Gray Quadrature Phase Shift Keying (QPSK) because it has great benefits in iterative decoding.

The outputs of this thesis are: (i) channel models for harbor wireless communication systems, (ii) outage performance for harbor channel models that is expected to be useful as harbor telecommunications reference, (iii) good simple channel coding scheme indicated by the excellent performance of BER and FER curves close to the Shannon limit, and (iv) EXIT charts for demapper and decoder showing the excellences of the proposed channel coding. The results of this thesis are expected to contribute to the development of a reliable wireless communication system for the harbor in Indonesia.

Keywords: wireless communication at the harbor, container monitoring, iterative decoding, repetition codes, accumulator, non-Gray, outage performance, EXIT chart.