

## ABSTRACT

The transportation route in mining areas consists of various complex fields, where reliable communication systems, called mining communication system to monitor the transportation is important and urgent. This thesis designs a reliable communication system for monitoring transportation in the mining industry by using a channel model that is suitable for mining environmental conditions.

The mining communication system consists of a Base Station (BS) and sensors (S) on a mine train. This thesis also evaluates the use of relays (R) to obtain better performances. Channels for mining communication systems are predicted in this thesis using the Statistical Spatial Channel Model (SSCM) concept for mining areas in Indonesia.

Furthermore, channel capacity on each link between S and BS, S and R, and R and BS are obtained and calculated based on outage probability as the theoretical basis for mining communication systems. Outage performance of mining communication system is validated using bit error rate (BER) and frame error rate (FER). This thesis found that relay helps significantly the improvement on BER and FER performances.

**Keywords:** Mining Communication System, relay, channel modeling.