

# Systematic Range Error Analysis for the Communications Satellite System

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This paper systemetically described the analyses for the communications satellite system consisting of the spacecraft and TT&C station range errors. Ranging is a procedure carried out to determine the satellite orbital elements. The TT&C station should continually transmit four tones to the spacecraft which repeats them back to the ground. It turned out that the phase shift in each of the tones was proportional to the two-way travel time of the tone, plus biases added by the TT&C station. Subtracting the equipment delay of the TT&C station left only the travel time and so indicated the distance from the TT&C station to the spacecraft. The essential purpose of this study was to predict the net static bias by using the theoretical methods for Koreasat satellite system. It was also highlighted that theoretical justifications of the overall spacecraft and TT&C station ranging errors were estimated based on several Koreasat TC&R subsystem requirements.

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