TSIM
TDRS Link Test Simulator

KRATOS | RT LOGIC

Overview

The Kratos RT Logic TDRS Link Test Simulator (TSIM) generates all the spread spectrum signals used by the NASA Tracking and Data Relay Satellite System (TDRS). The TSIM was built for NASA as an economical alternative to the TDRSS User RF Test Set (TURFTS) in order to test payloads and transponders that will access TDRS while orbiting. Kratos RT Logic can easily modify the basic TSIM for other applications. As a fully integrated system (typically rack-mounted), the TSIM comes with a Graphical User Interface (GUI) for easy configuration, as well as defined API for control across the network.

Application

The TSIM receives command data and generates the TDRS spread spectrum forward link signal. The forward link signal contains the command data modulo-2 added to a command PN sequence and a ranging PN sequence. The two PN sequences are modulated in an unbalanced Quadrature Phase-Shift Keying (QPSK) format. The TSIM receives the return link RF signal, and despreads and demodulates either the Data Group 1 (Mode 1, Mode 2, or Mode 3) return link PN codes or demodulates Data Group 2. The return link (Data Group 1 Mode 1, 2, or 3) signal is demodulated in a staggered QPN format known as Staggered Quadrature PN (SQPN), and allows data to be placed on both the I and Q phases. Epochs from the forward and return links are used for range measurements. The return link (Data Group 2) signal is demodulated in a staggered QPSK format, known as Staggered Quadrature Phase-Shift Keying (SQPSK), and allows data to be placed on both the I and Q phases. The TSIM recovers this data, and outputs data and clock for both I and Q streams or interleaves the I and Q streams into a single data stream. A Doppler simulator allows any Doppler profile to be easily simulated on the forward link.

Note: For the return link (Data Group 1 Mode 3) only the I channel needs to be despread.