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SPACE COMMUNICATIONS AND NAVIGATION SYMPOSIUM (B2)
Advanced Technologies for Space Communications and Navigation (4)

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RECENT SUCCESSES AND FUTURE PLANS FOR NASA'S SPACE COMMUNICATIONS AND NAVIGATION TESTBED ON THE INTERNATIONAL SPACE STATION

Abstract

Flexible and extensible space communications architectures are essential for enabling future space exploration and science activities. NASA has been championing the development of the Space Telecommunications Radio System (STRS) software defined radio (SDR) standard and has developed an on-orbit testbed. The Space Communications and Navigation (SCaN) Testbed (previously known as the Communications, Navigation, and Networking reConfigurable Testbed (CoNNeCT)) is advancing SDR, on-board networking, and navigation technologies by conducting space experiments aboard the International Space Station.

During its first year the SCaN Testbed has reached great accomplishments in better understanding of SDRs and their applications. The software and waveforms on each SDR are performing as designed. The Ka-band SDR is NASAs first space Ka-band transceiver and the SCaN Testbed is NASA's first Ka-band mission using the Space Network. This has provided exciting opportunities to operate at Ka-band and assist with on-orbit tests of NASA newest Tracking and Data Relay Satellites (TDRS). During its first year SCaN Testbed completed its first on-orbit SDR reconfiguration. SDR reconfigurations allow a radio to change minor parameters (such as data rate) or complete functionality. The SDR reconfigurations only happen with new waveforms, and now progress has been made using waveforms developed by organizations other than the platform provider. Each of these cases required developing a waveform build environment for the particular SDR, assessed the usefulness of the platform provider documentation, and exercised the objectives of STRS. The experiments program is continuing to provide additional opportunities for waveform development by third parties, and helping to make improvements to the STRS Standard and documentation requirements. Experiment interest continues to accelerate. There are 25 experiments or activities supported by the project underway or in development, with more proposals ready, as time and funding allow, and new experiments are being solicited. The first two university experimenters have been selected, which will support the next generation of communications engineers. Navigation is also an important aspect, and GPS experiment activities are underway and the first international experiment with the Centre National d'Etudes Spatiales (CNES) is in work.

Its recent successes in Ka-band operations, reception of the newest GPS signals, SDR reconfigurations, and STRS demonstration in space when combined with the future experiment portfolio have positioned the SCaN Testbed to enable future space communications and navigation capabilities for exploration and science.