Paper ID: 31669
oral

SPACE COMMUNICATIONS AND NAVIGATION SYMPOSIUM (B2)
Space Communications and Navigation Young Professionals Virtual Forum (8-YPVF.3)

Author: Mr. Jeff Kraus
National Aeronautics and Space Administration (NASA), United States

Ms. Priyanka Srivastava
University of Michigan, United States

SCENIC MODEL CONTROL: A SIMULATION SYSTEM FOR SPACE COMMUNICATIONS NETWORKS

Abstract

NASA's Space Communications and Navigation (SCaN) program manages three active networks: the Near Earth Network, the Space Network, and the Deep Space Network. These networks simultaneously support NASA missions and provide communications services to customers worldwide. To efficiently manage these resources and their capabilities, a team of student interns at the NASA Glenn Research Center is developing a distributed system to model the SCaN networks. Once complete, the system shall provide a platform that enables users to perform capacity modeling of current and prospective missions with finer-grained control of information between several simulation and modeling tools. This will enable the SCaN program to access a holistic view of its networks and simulate the effects of modifications in order to provide NASA with decisional information.

The development of this capacity modeling system is managed by NASA's Strategic Center for Education, Networking, Integration, and Communication (SCENIC). Three primary third-party software tools offer their unique abilities in different stages of the simulation process. MagicDraw provides UML/SysML modeling, AGI's Systems Tool Kit simulates the physical transmission parameters and de-conflicts scheduled communication, and Riverbed Modeler (formerly OPNET) simulates communication protocols and packet-based networking. SCENIC developers are building custom software extensions to integrate these components in an end-to-end space communications modeling platform. A central control module acts as the hub for report-based messaging between client wrappers. Backend databases provide information related to mission parameters and ground station configurations, while the end user defines scenario-specific attributes for the model. The eight SCENIC interns are working under the direction of their mentors to complete an initial version of this capacity modeling system during the summer of 2015. The intern team is composed of four students in Computer Science, two in Computer Engineering, one in Electrical Engineering, and one studying Space Systems Engineering.