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On Schedule

The Air Force Keeps Its Satellite Network Fine-Tuned With Support From STK

IF THE AIR FORCE SATELLITE CONTROL NETWORK (AFSCN) were a telephone company, its lines would be ringing off the hook. As the largest network the U.S. Air Force uses to control satellites, the AFSCN's eight ground stations around the globe talk to more than 100 communications, navigation, missile warning, and meteorological satellites each day. Every 24 hours, network personnel perform more than 500 scheduled events—from satellite communications to tests and program maintenance.

To optimize the AFSCN's current and future coverage and capacity, Scitor Corporation works under contract with the 50th Space Wing Studies and Analysis Branch at Schriever Air Force Base, CO, to develop utilization forecasts. These near-term and long-term network forecasts ensure that the ground system meets the needs of satellite users today and in the future. Scitor also runs studies to answer "what-if" questions for exercises and battlespace simulation.

In 2002, when branch personnel were searching for software to supplement their legacy tools, they chose STK/Scheduler, which quickly became important to simulating a "day in the life" of the network. "Our legacy software remains an essential part of our tool kit," says Byron Hays, Scitor contractor and lead for the branch's modelling and simulation team that includes Andrew Carlile and Tom DeLaCruz. "However, STK/Scheduler is the most promising tool we have used in a while."

While 50th Space Wing personnel and contractors have forecast for the past 12 years with proven government legacy software that is fast and accurate, they wanted more. "We were looking to automate the forecasting process; to become more sophisticated in detailing how the antennas on the specific sites were utilized; and to support requirements tied to orbit events, time, locations, and other variables," says Hays.

Another impetus for checking out software was that national space policy is directing integration with other networks such as NASA, NOAA, and the Navy, and the branch needed a tool to help them determine how to do that the most effectively. Lastly, they wanted to automatically generate orbit and scheduling graphs—a feature their legacy software didn't provide.

STK/Scheduler, combined with STK software products they already owned—STK/Professional Edition, STK/Communications, STK/Coverage, and STK/Integration Module—gives the branch a robust scheduling and satellite operations analysis suite and immediately cut down on forecasting time.

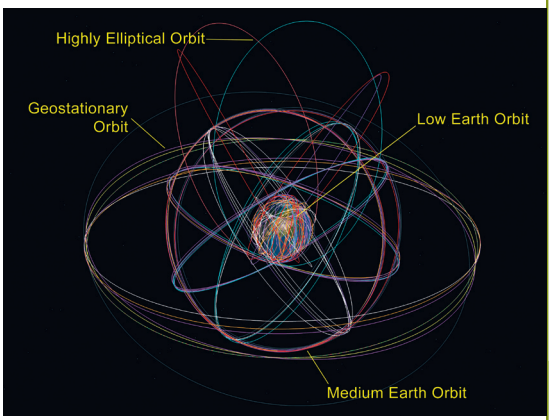
STK's 3-D visualization component, which can output STK data in three-dimensional, animated displays, adds value to analysis. "The 3-D graphics better communicate load stresses to the system than line graphs," says Hays. "You can show on a graph that the system is 88% utilized, but it's hard to understand what that means. This is especially true when we brief non-technical users." With 3-D dynamic depictions, Hays can show the ground station with the satellites flying overhead and denote those that the antennas can and cannot communicate with. While 88% utilization may look good on a graph, "When you see the number of satellites that the antennas can't contact, you easily grasp the missed opportunities," Hays says.

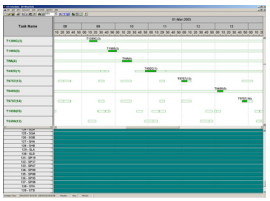
As a result, STK/Scheduler has quickly become a cornerstone of the branch's analysis tools. "Almost everything we use with STK is essential to the analysis we provide," says Hays.

STK Basic Edition, AGI's free core product, has proven invaluable, alone. When the IMT 2000 (the next generation of commercial cell networks) studies were being conducted, there was concern that cell users would take some of the bandwidth the AFSCN uses to talk to satellites. "With STK Basic Edition, we generated a simple graph that showed we wouldn't be able to contact some of the geo satellites, and that took the discussion off the table," says Hays. Therefore, Hays and his co-workers could return to focusing on what they do best: providing leadership, data, and insight to effectively manage network operations.

So, with a little help from STK, the AFSCN is keeping the lines of communication open—to the satellites, the network, its operators, and users. ▲

STK models the 100-plus LEO, MEO, HEO, and GEO satellites in the AFSCN communications network.





STK/Scheduler automates the complicated task of 10-year utilization forecasting for the AFSCN.

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