

A CASE STUDY: NASA SPACE COMMUNICATION NETWORK ARCHITECTURE ANALYSIS

INTEGRATING STK WITH OTHER COTS TOOLS TO ADVANCE MODELING AND SIMULATION

Solution | Space Mission Design & Operations

Challenge:

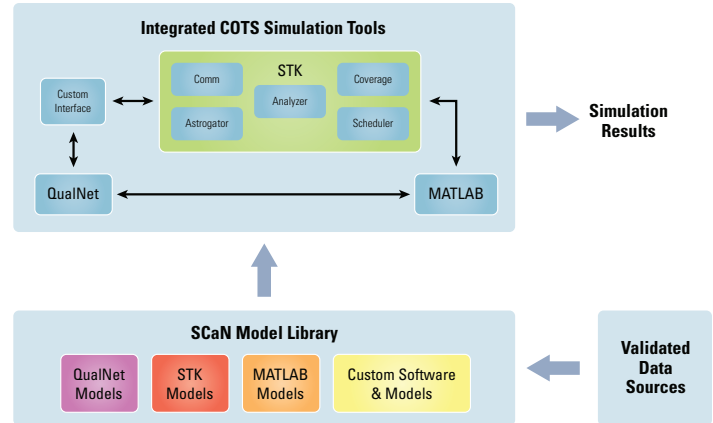
Increased technological capabilities are driving customer demand for complex, modern NASA space communication networks that facilitate higher data rates and common interfaces. In addition, measuring performance through real-world testing is difficult and expensive. NASA wanted to implement these new architectures despite limited human and financial resources.

Solution:

To evolve NASA's SCaN (Space Communications and Navigation) Communication architecture to its notional integrated communication architecture by 2025, NASA Glenn Research Center turned to a suite of COTS tools, including AGI software, to perform cost-efficient analysis of how proposed changes would impact the current architecture.

Results:

STK's extensibility enabled the integration of various COTS tools to address large and complex system and network architecture questions. As a COTS tool, STK is being leveraged across NASA projects and centers.



- Provide the highest data rates feasible for both robotic and human exploration missions
- Assure data communication protocols for space exploration missions are internationally interoperable
- Provide the end space communication and navigation infrastructure for Lunar and Mars surfaces and missions

To predict performance, NASA modeled elements of official documents (either from NASA, its customers or another standards group) in one of its COTS tools, or generated custom models, as needed. Those models were then pulled into the Integrated SCaN Simulator which runs the simulation and produces the final result. NASA Glenn utilized various case studies, including:

- Near Earth Network Low Elevation Study
- CCSDS Link Layer Security Impact Assessment
- NASA Integrated Services Network Loading Study
- Deep Space Network Coverage Analysis Study

“With new and more complex architectures, advanced simulation tools are required to do analysis. Something like STK, which is able to integrate multiple tools, has been very beneficial for this analysis.”

— Michael Fuentes,

**SPACE COMMUNICATION NETWORK ARCHITECT
AND PRIVATE CONSULTANT AT NASA GLENN**



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