Lockheed Martin/Northrop Grumman Team Advances New High Speed Data Transfer Technology For TSAT

A Lockheed Martin/Northrop Grumman team has achieved a key design milestone for a high-performance technology solution that will dramatically increase data transfer speeds in the U.S. Air Force's Transformational Satellite Communications System (TSAT) constellation.

TSAT will provide thousands of military users with wideband, highly mobile, beyond line-of-sight protected communications to support network-centric operations for the future battlefield.

Known as SpaceWire, the new data "bus" technology provides on-orbit satellite internal communications for box-to-box and system-to-system data transfer that is equivalent to a local area network (LAN) in space.

The team has matured this technology to the Preliminary Design Review level, marking a key risk reduction achievement for TSAT. The milestone defines the flexible and scalable architecture, physical and logical interfaces, and electrical design of the databus which replaces the military standard databus known as Mil-Std-1553.

"SpaceWire is the ideal solution for TSAT," said Mark Pasquale, Lockheed Martin's TSAT vice president. "It can transfer electronic data at least 80 times faster than current databus technology and introduces a highly reliable and robust distributed architecture routing system making it desirable for TSAT which requires large amounts of data to move around the spacecraft."

SpaceWire is a self-managing serial protocol that provides a high-speed low-power system while offering a flexible simple user interface and enhanced capabilities that provide significant advantages over traditional satellite systems.

These include the capability to assist the in-flight processor by offloading repetitive tasks to the embedded SpaceWire processor, and reduced cabling by providing the capability to combine many different kinds of signals onto two single conductor pairs; reducing the physical size and weight of inter-module cable bundles and the subsequent mass the launch vehicle must carry into orbit.

The system is scalable and is based on a qualified, radiation tolerant, BAE SpaceWire packet data router Application Specific Integrated Circuit. The system uses standardized and qualified parts, proven protocols, with significant growth potential. All of these together reduce future risk of obsolescence, making this useful for decades to come.

This databus compliments the new generation TSAT radiation hardened on-board flight computer. Together they enable a low-risk TSAT mission by significantly increasing internal satellite data throughput and processing power while reducing mass for the given capability.

TSAT represents the next step toward transitioning the Department of Defense wideband and protected communications satellite architecture into a single network comprising multiple satellite, ground, and user segment components. The system ultimately will replace the Milstar and Advanced Extremely High Frequency (AEHF) programs and provide the Global Information Grid network extension to mobile warfighters, sensors, weapons, and command, control, and communications nodes located on unmanned aerial vehicles, piloted aircraft, on the ground, in the air, at sea or in space.

The Lockheed Martin/Northrop Grumman TSAT space segment team is currently working under a $739 million contract for the Risk Reduction and System Definition phase. This effort will culminate with a multi-billion dollar development contract scheduled to be awarded to a single contractor in 2010.

The Military Satellite Communications Systems Wing, located at the Space and Missile Systems Center, Los Angeles Air Force Base, Calif., is the TSAT contract manager and lead agency for ensuring the capabilities of this system are made available to the warfighter.

Headquartered in Bethesda, Md., Lockheed Martin is a global security company that employs about 146,000 people worldwide and is principally engaged in the research, design, development, manufacture, integration and sustainment of advanced technology systems, products and services. The corporation reported 2008 sales of $42.7 billion.

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