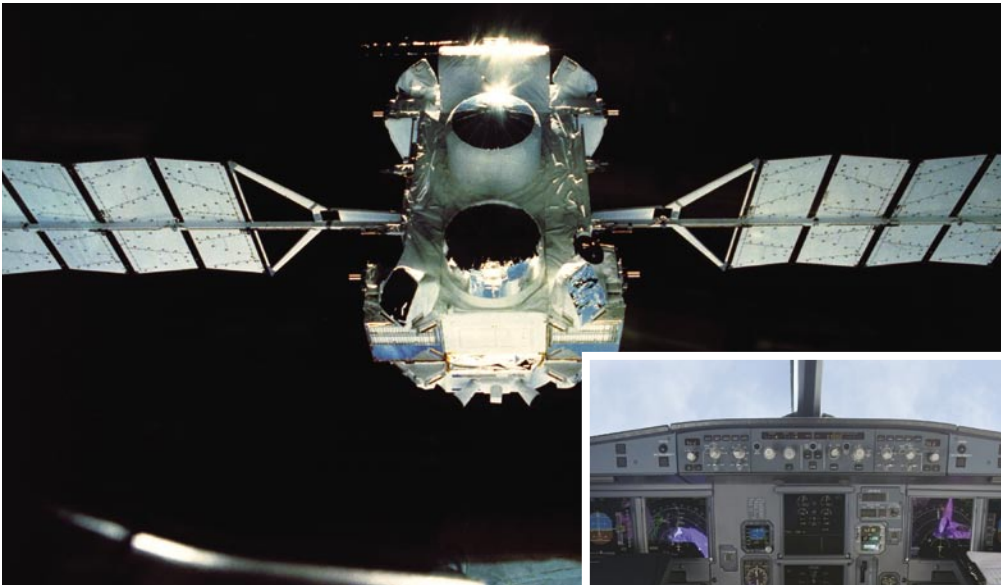




# Goddard Helps BAE Systems Build New SpaceWire-Based ASIC



A new Space Act Agreement (SAA) between NASA Goddard Space Flight Center (GSFC) and BAE will enable the company to build a new application-specific integrated circuit (ASIC) design for Goddard's SpaceWire link-and-switch ("router") technology using technical support and consultation from Goddard researchers. Integrating the SpaceWire router functionality into BAE's computer board design will benefit NASA's missions as well as other aerospace organizations by lowering the cost, required power, and number of parts needed to integrate the technology's functionality into space-based computer systems. The collaborative effort also benefits NASA by supporting the standardization of the SpaceWire router design.



## Benefits of Technology Transfer

- BAE Systems may gain competitive advantage by integrating the SpaceWire router functionality into its onboard computer system, making the computer desirable to NASA, the military, and other U.S. aerospace organizations.
- The larger U.S. aerospace market will benefit from the availability of a new computer board design with native SpaceWire router functionality.
- Future NASA missions, particularly satellite missions, will benefit from the new SpaceWire-based computer board, providing a main processor that has a smaller size and fewer parts and uses less power than currently available designs.

## On the Record

“Developing a technology like SpaceWire is a big R&D effort, one requiring international cooperation and standards development. By continuing technology transfer relationships with companies like BAE, we can protect our efforts by making sure the products they are selling are in line with what NASA (and other aerospace organizations) need and contain the latest SpaceWire technology.” - *Glenn Rakow, SpaceWire innovator, GSFC*

## About BAE Systems

BAE Systems is a global company engaged in the development, delivery, and support of advanced defense and aerospace systems. With major operations across five continents, the company has customers and partners in more than 100 countries and 88,000 employees worldwide. The company delivers a full range of products and services for air, land, and naval forces as well as advanced electronics, information technology solutions, and customer support services. With annual sales exceeding US\$22 billion, BAE is the fourth largest defense company in the world and the largest defense company in Europe.

## Technology Origins

The SpaceWire specification is a set of serial links that describe a network fabric used to move information defined in packets. Goddard's SpaceWire router is a unique implementation of the specification that enables avionics computers to communicate seamlessly at varying data rates (2 Mbps to more than 200 Mbps), minimizing interconnects. The communication allows resources to be distributed and provides for redundancy across spaceflight applications.

## Technology Improvement through Collaboration

BAE first collaborated with Goddard in 2002 on the design of a SpaceWire ASIC, a chip that was used as a peripheral or stand-alone bridge between existing space electronics and the new SpaceWire functionality. The current effort will result in an ASIC that will provide native SpaceWire functionality on the company's RAD 750™, a leading space-based computer for U.S. aerospace markets. This new ASIC will connect any new or existing chip or functionality with SpaceWire, making all future space computer boards using it SpaceWire-compatible. By replacing the stand-alone ASIC with a native ASIC, the collaborative effort will decrease the part count, ongoing costs, and power requirements for the space computer board.

## The Transfer Process

Goddard first began a technology transfer relationship with BAE in 2002 with an SAA enabling the company's first SpaceWire ASIC design. Since that time, Goddard researchers and Innovative

Partnership Program (IPP) Office personnel have kept in close contact with BAE, with ongoing discussions with the company's engineers and management to help understand their current and future product plans involving SpaceWire. When the company decided in 2006 to integrate the SpaceWire router implementation natively into its new space computer board design, they engaged with Goddard researchers and IPP Office staff in an effort to begin working with the technology as quickly as possible. The IPP Office staff worked with BAE and Goddard researchers to develop a benefits statement and statement of work, followed by a very aggressive agreement schedule. Working together, all parties were able to put the agreement in place in less than one month, keeping BAE on schedule for its new design.

## Looking Ahead

BAE expects to finish its new SpaceWire ASIC design by early 2008. If subsequent testing goes as planned, the company should have working boards available for NASA missions and other aerospace companies within about two years. NASA missions being formed now may choose to use BAE's new processor board at that time. In the meantime, Goddard's IPP Office will continue a dialogue with the company to maintain its successful technology transfer relationship.

## For More Information

If you would like additional information about Goddard's technology transfer opportunities, please contact:

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