

SBIR Topic Number:
AF05-031

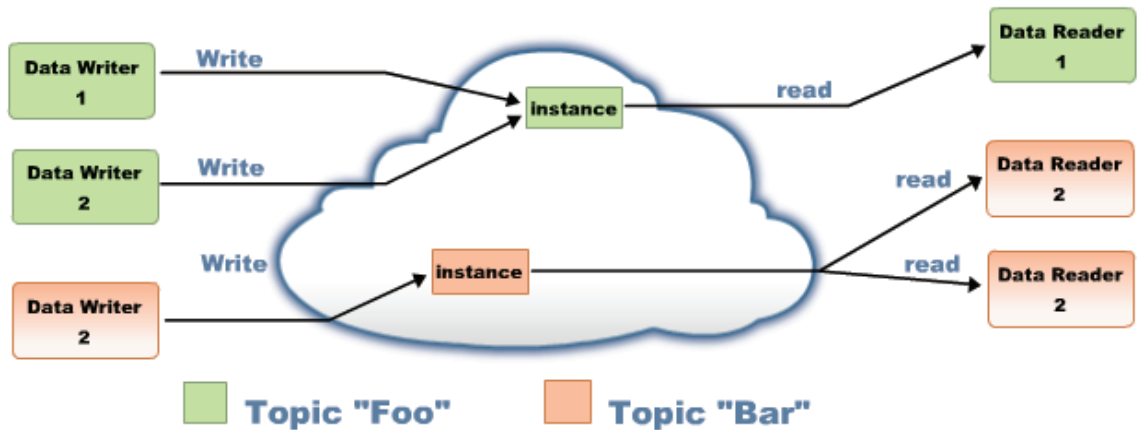
SBIR Title:
Innovative Data/Electrical
Interfaces for Modular
Spacecraft

Contract Number:
FA9453-06-C-0053

SBIR Company Name:
Real-Time Innovations,
Sunnyvale, CA

Technical Project Office:
AFRL Space Vehicles
Directorate, Kirtland AFB,
NM

This Air Force SBIR/STTR Innovation Story is an example of Air Force supported SBIR/STTR technology that met topic requirements and has outstanding potential for Air Force and DoD.



Data Distribution Service (DDS) publish subscribe implements an abstract global data space. Participants simply publish what they know and subscribe to what they need. DDS strictly controls communications, thus enforcing a loosely coupled architecture.

Innovative Data Distribution Service (DDS) Interfaces for Modular Spacecraft

- The Air Force needs to have the capability to rapidly reconfigure and tailor satellites prior to launch
- Real-Time Innovations (RTI) developed the RTI Data Distribution Service (DDS), Safety-Critical Edition, which is a small-footprint implementation of the Object Management Group (OMG) DDS standard to meet the Air Force's requirements for a middleware that can run on small hardware
- This middleware provides a static discovery of components, allowing new components to be configured in the system and discovered when they run
- The Safety-Critical Edition provides a high performance, application-layer messaging infrastructure that enables easy integration between distributed components of avionics systems, including sensors, actuators, displays, and ground-control stations
- By providing a commercial, high level, and standards-compliant alternative to in-house development, RTI significantly reduces the cost and risk associated with safety-critical software development, maintenance, and certification

377ABW-2010-0775

A

DISTRIBUTION A:
Approved for public
release; distribution
unlimited.

Air Force Requirement

The Air Force has an operational need to be able to launch satellites on demand for a variety of missions. A critical capability required to achieve such a goal is the rapid reconfiguration and tailoring of satellites prior to launch. To help achieve the six-day mission, the Responsive Space Laboratory uses the Satellite Data Model (SDM) to provide capabilities of a self-discovering data network.

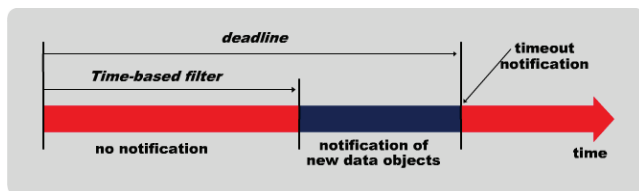
SBIR Technology

Real-Time Innovations (RTI) developed the RTI Data Distribution Service (DDS), Safety-Critical Edition, which is a small-footprint implementation of the Object Management Group (OMG – see www.omg.org) DDS standard to meet the Air Force's requirements for a middleware that can run on small hardware.

This middleware provides a static discovery of components, allowing new components to be configured in the system and discovered when they run. RTI's small-footprint version of DDS also provides a subset of the quality of service (QoS) defined by the DDS standard, including deadline and liveliness mechanisms that allow an application to detect failures in a distributed system. This small-footprint version of DDS is designed to be deterministic, so it can fulfill any future safety certification requirements.

Potential Air Force Application

The RTI Data Distribution Service, Safety-Critical Edition is the first commercial, standards-based integration solution for high-assurance applications.



DDS provides real-time Quality of Service (QoS) to ensure that consumers receive data when they need it, and are notified when data does not arrive.

The Safety-Critical Edition provides a high performance, application-layer messaging infrastructure that enables easy integration between distributed components of avionics

systems, including sensors, actuators, displays, and ground-control stations. By abstracting out low-level networking and communication details and providing a loosely-coupled integration framework, Safety-Critical Edition reduces software complexity and minimizes the amount of application code that has to be created. This accelerates integration and eases certification and long-term maintenance.

Developers of avionics systems have traditionally had to create, maintain, and certify their own inter-application and inter-processor communication middleware. This was required to satisfy demanding real-time performance requirements, stringent resource constraints, certification processes, and to support specialized operating systems and hardware platforms. By providing a commercial, high level, and standards-compliant alternative to in-house development, RTI significantly reduces the cost and risk associated with safety-critical software development, maintenance, and certification.

Company Impact

"The SBIR Program has allowed Real-Time Innovations to develop a new product for safety-critical systems, and generate significant new growth opportunities for the company," states Dr. Stan Schneider, RTI's chief executive officer.

RTI supplies middleware and distributed data-management solutions for real-time systems. RTI's solutions have been deployed in a broad range of applications including commence-and-control, intelligence, surveillance, data fusion, simulation, industrial control, air traffic control, railway management, roadway traffic monitoring and multimedia communications.



SBIR/STTR

Air Force SBIR Program
AFRL/XP
1864 4th Street
Wright-Patterson AFB OH 45433

AF SBIR/STTR Program Manager: Augustine Vu
Website: www.sbirsttrmall.com
Comm: (800) 222-0336
Fax: (937) 255-2219
e-mail: afrl.xppn.dl.sbir.hq@wpafb.af.mil

