RTI CUSTOMER SNAPSHOT

General Atomics Aeronautical Systems, Inc.

UNMANNED AIRCRAFT SYSTEMS (UAS) GROUND CONTROL STATION (GCS)

"General Atomics had to meet strict requirements for data bandwidth and availability. They could have designed and implemented a custom solution for data integration on their own, but that would have significantly delayed the project. Plus the lifecycle cost of developing and maintaining a custom software solution for a specific project can be enormous."

Stan Schneider
Chief Executive Officer, RTI

HIGHLIGHTS

- General Atomics is a leader in high-technology systems including remotely-operated surveillance aircrafts, airborne sensors and advanced laser technologies.
- General Atomics selected RTI Connext DDS for the real-time data distribution, bandwidth and processing in the Ground Control Station (GCS). This architecture enabled GA-ASI to support the new features and mission capabilities required by the U.S. Air Force.

COMPANY OVERVIEW

General Atomics Aeronautical Systems, Inc. (GA-ASI) is a leader in high-technology systems development ranging from the nuclear fuel cycle to remotely operated surveillance aircraft, airborne sensors, and advanced electric, electronic, wireless and laser technologies. Among its projects is the design and development of advanced cockpit ground control stations (GCSs) for unmanned aircraft systems (UASs) such as the military Predator drones. Unmanned aircraft systems are controlled and flown from GCSs on the ground, which require real-time data and control links to every sensor and control surface on the aircraft.

CHALLENGE

General Atomics began design and development of the Advanced Cockpit GCS for the US Air Force in early 2006, and has continued with Advanced Cockpit development specifically for the MQ-1 Predator and MQ-9 Reaper UAS in 2007. As a part of this effort, the company required a solution for real-time data distribution across the network employed by the GCS for acquisition, analysis, and response for remote control of the UAS.

Because of their role in monitoring and controlling a UAS, GCSs generate and process large amounts of data. Multiple sensors onboard the UAS collect data on flight conditions, airframe configuration, onboard instrument status, and position and direction, and use that data to both maintain mission characteristics and provide the ground control station with current data on the mission profile and health of the UAS. The CGS monitors the mission parameters and data from the UAS, and makes adjustments as necessary. The GCS relies on real-time data from the UAS in order to monitor, make decisions, and adjust UAV flight characteristics.

The volume of data and the requirement for real-time analysis and response, with the control signals sent across significant distances to the UAS, are characteristics that demand both high performance and guaranteed response times. Data exchange between multiple nodes on a ground network that also communicates with sensors and control instrumentation on a flying platform is a challenging and complex problem.

SOLUTION

After evaluating both commercial distributed networking alternatives and potential in-house custom code, General Atomics selected RTI Connext DDS for real-time data exchange and processing for the GCS. Connext DDS is a standards-based middleware product that enables the real-time exchange of data between nodes of a distributed system that consists of both data producers and data consumers. Using a publish-subscribe model for data availability, it provides a means to quickly and reliably move and share data in a distributed computing environment. Connext DDS complies with the Object Management Group (OMG) Data Distribution Service for Real-Time Systems (DDS) specification for data distribution across large-scale networks.

Connext DDS met General Atomics' requirements for real-time data distribution, bandwidth, and processing in the GCS. It enabled the company to implement the data distribution features needed the GCS without writing significant amounts of custom code. The use of the Connext DDS enabled General Atomics to complete the major upgrade of the Advanced Cockpit GCS in only 14 months. The company successfully demonstrated the GCS solution during the flight of a mission-configured MQ-1 Predator UAS in July 2007.

Without a commercial middleware solution for real-time data distribution, General Atomics would have had to develop and maintain its own code to ensure data flowed between nodes within the required time constraints. While technically possible, such an approach almost certainly would not have been able to be accomplished within the tight time constraints required by the customer.

"If General Atomics had to develop a custom solution for real-time data distribution, it would have taken significantly longer even to demonstrate the technology solution," explained Schneider. "The use of RTI Connext DDS as a platform enabled the company to focus its efforts on electronics and software enhancement and integration, rather than building and maintaining a comprehensive data distribution mechanism as an integral part of the solution. The tight deadlines for demonstration could not have been met."

BENEFITS

RTI provided General Atomics with the middleware solution to develop the distributed communications architecture that supports new features and mission capabilities required by the US Air Force. Using RTI enabled General Atomics designers and engineers to concentrate on integrating technologies such as intuitive touch-screen technology, superior ergonomic design, and wide-screen video presentations that dramatically expanded all visual cues provided to the pilot and sensor operator. Together, these enabled General Atomics to deliver improved situational awareness, reduced pilot workload, and better data coordination needed to effectively operate a UAS.

ABOUT RTI

Real-Time Innovations (RTI) is the largest software framework provider for smart machines and real-world systems. The company's RTI Connext® product enables intelligent architecture by sharing information in real time, making large applications work together as one.

With over 1,500 deployments, RTI software runs the largest power plants in North America, connects perception to control in vehicles, coordinates combat management on US Navy ships, drives a new generation of medical robotics, controls hyperloop and flying cars, and provides 24/7 medical intelligence for hospital patients and emergency victims.

RTI is the best in the world at connecting intelligent, distributed systems. These systems improve medical care, make our roads safer, improve energy use, and protect our freedom.

RTI is the leading vendor of products compliant with the Object Management Group® (OMG) Data Distribution Service™ (DDS) standard. RTI is privately held and headquartered in Sunnyvale, California with regional headquarters in Spain and Singapore.

Download a free 30-day trial of the latest, fully-functional Connext DDS software today: https://www.rti.com/downloads.

Your systems. Working as one.

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