

# RTI Middleware for Simulation Applications

## Real-Time COTS Solution across Heterogeneous Systems

### BENEFITS

- Real-time data distribution — high performance, low latency
- Easy, fast adoption — focus on your application, not on infrastructure
- Share data without creating unique interfaces for each system
- Add new systems without designing explicit awareness of other systems
- Gain real-time benefits of DDS while maintaining HLA compatibility

One of the critical elements of today’s complex simulation environments is the middleware that enables sharing of data between multiple heterogeneous subsystems. Necessary characteristics of this middleware component are real-time performance and the ease at which new subsystems can be added to the simulation environment. RTI’s Data Distribution Service middleware exceeds the real-time performance requirements of the most demanding simulator applications, providing high-performance and low-latency data exchange, even in complex and diverse environments.

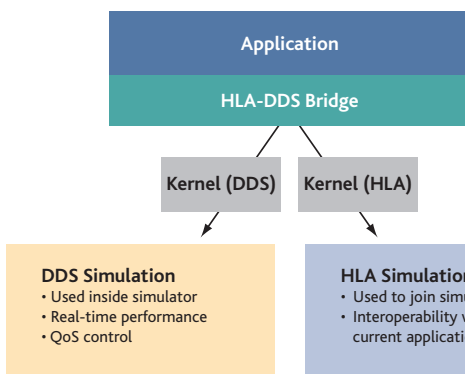
RTI Data Distribution Service is currently in use in many large-scale, complex simulation environments with high real-time demands and diverse and expanding applications.

### High-Performance, Low-Latency

Simulation environments are often complex systems made up of diverse, heterogeneous components. These environments require communication infrastructure for sharing data between subsystems, and typically there is a high demand for real-time data exchange, with low latency and high reliability.

RTI Data Distribution Service middleware solves the requirement for high-performance, low-latency data communications infrastructure even in the most complex, diverse simulation environments. RTI’s proven commercial off-the-shelf (COTS) middleware solution is in use in a number of large-scale commercial simulators today, primarily because it is based on the only middleware technology — OMG Data Distribution Service (DDS) — that can keep up with the real-time performance demands of many of these applications. Unlike other commercial networking middleware technologies, DDS was designed specifically to ease the development of heterogeneous distributed systems with real-time data distribution requirements.

Additionally, the DDS publish-subscribe paradigm allows simulation subsystems to share data without requiring unique interfaces for each new system — the new system merely needs to “subscribe” to the desired dataset. This frees the application developer from needing to know about the internals of the other subsystems required to share data, making the addition of new systems a breeze.



*DDS and HLA can be used together, providing the benefits of each to simulation projects.*

### Using DDS with HLA

The High-Level Architecture (HLA) is the IEEE-standard, general-purpose architecture for distributed simulation systems. HLA’s primary objectives are to enable reusability and interoperability of simulation systems by providing a common specification for interfaces and objects.

While HLA and DDS are both based on a flexible publish-subscribe paradigm, HLA has a number of shortcomings over DDS, such as a lack of Quality of Service features and no standard wire protocol. HLA is designed for simulation, while DDS is designed for real-time. DDS brings important benefits to simulation applications, such as lower latency, better communication determinism and runtime behavior, enhanced QoS, and wire interoperability.



Fortunately, commercial applications are available that enable DDS and HLA to be used together, providing the benefits of each to simulation projects. Please contact RTI for more details.

### Customer Applications

#### *National Advanced Driving Simulator*

The US Army and University of Iowa cooperated to create several high-fidelity simulators to demonstrate how US Army vehicles and components can be tested and evaluated using virtual proving ground (VPG) technology. They needed a middleware solution that was truly effective at real-time, low-latency data interchange to manage the large number of simulation components working in conjunction.

#### *FORCE Multi-Ship Simulation*

Force Technology, market leader in the design of multi-ship simulator systems, created the world's first system to provide a complete environment for training tugboat captains in maneuvering large vessels such as oil and gas tankers into restricted spaces using multiple tugs. They required middleware that would offer real-time data interchange between subsystems without requiring the developers to know about the internals of each subsystem added to the application.

#### *CAE Sim XXI Full Flight Simulator*

CAE's Sim XXI full-flight simulator is regarded by pilots around the world as the closest simulation of the true experience of flight. It delivers breakthrough visual realism, precise cockpit replication, high-fidelity avionics simulation, and flight and ground-handling characteristics indistinguishable from the aircraft. Achieving this level of full-flight simulation involves a variety of complex subsystems sharing and processing data in real-time.

#### *US Navy HiPer-D*

The Naval Sea Systems Command (NAVSEA) Dahlgren Division needed to investigate how to apply advanced technologies and concepts to the Naval Surface Ship Anti-Air Warfare (AAW) problem domain. They tasked the US Navy High Performance Distributed Computing Project (HiPer-D) with creating test bed demonstrations, based fully on COTS technology, that would allow NAVSEA to investigate technologies supporting real-time, distributed, scalable, fault-tolerant, heterogeneous computing systems to be used in combat systems.

*RTI Data Distribution Service was selected by Force Technology to meet critical performance requirements in the world's first four-ship tug simulator system.*



#### About RTI

Real-Time Innovations (RTI) works in partnership with its customers to develop and integrate the world's most demanding real-time applications. RTI takes the risk out of distributed application development and system integration by providing deep expertise in real-time communications coupled with the highest performance messaging middleware. The company's software and services have been leveraged in a broad range of industries including defense, intelligence, simulation, industrial control, transportation, finance, medical and communications. Founded in 1991, RTI is privately held and headquartered in Santa Clara, California. For more information, please visit [www.rti.com](http://www.rti.com).

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