



CAPABILITY BRIEF

RTI Connex for Maritime Autonomous Systems

A DATA-CENTRIC APPROACH TO SHIPPING, EXPLORATION AND DEFENSE

HIGHLIGHTS

- Delivers real-time software connectivity framework for maritime systems
- Promotes Modular Open Systems Approach (MOSA) to isolate and decouple services
- Designed for rapid insertion, maintainability, and extensibility
- Proven mission-critical connectivity framework deployed in every modern surface ship in the U.S. Navy
- Dual-use system ready — The DDS standard on which Connex is built is the basis for the Navy’s UMAA initiative
- Supports DoD TOP-SECRET security level with standards-based encryption and authentication

RTI Connex® provides standards-based data communications infrastructure for maritime systems. Connex meets and exceeds requirements for mission critical applications including real-time, scalable, reliable and secure connectivity. Based on the open Data Distribution Service (DDS™) standard, Connex enables rapid system updates and mission readiness, while driving down system Maintenance costs.

The ocean is largely unexplored. It covers roughly 70% of the earth’s surface, and 80% of it remains unmapped. Half of all U.S. territory lies under the ocean, and virtually all of it is unmapped. RTI works with world leaders in building remotely operated vehicles (ROVs) and uncrewed underwater vehicles (UUVs) in offshore automation. These amazing ROVs can operate 1000s of meters below the surface while operators are safely on a ship. While historically, these vehicles have been teleoperated, now more and more autonomy is moving into the ROVs. Humans used to be predominantly in the loop; now, humans are on the loop in a supervisory role; eventually, humans will be out of the loop for certain functions.

Ships are becoming increasingly autonomous, and in the not-too-distant future, they will be uncrewed. The control system and helm require 360-degree situational awareness in an easy-to-understand interface. It must be redundant and able to perform many maneuver operations semi-autonomously.

To help customers achieve these new levels of autonomy, RTI Connex delivers data-centric communications capabilities that power defensive systems across the U.S. Naval fleet and those

of our allies. The Navy is changing — moving from large crewed ships and submarines to smaller, autonomous, and remotely-operated vessels. For example, the U.S. Navy’s new Unmanned Maritime Autonomy Architecture (UMAA) calls out DDS as the software connectivity standard of choice for ensuring that these vehicles are operating safely and at peak efficiency.

SOLUTIONS FOR THE CREATORS OF MARITIME SYSTEMS

The ocean is an unforgiving place. Creators of uncrewed and autonomous maritime systems face operational challenges in maritime environments that are constantly evolving with new technologies and threats.

Meeting the technological challenges requires an expansive list of mechanical systems, sensors, and effectors, which must quickly adapt to the environment and threats developed by adversaries. This is particularly true when building so-called “dual-use” systems, with applications for the U.S. Navy, and commercial applications.

To stay ahead of evolving project requirements, the following capabilities are required:

1. A MOSA software deployment approach that isolates and decouples services from hardware
2. System communications visibility and the ability to record and log activity during undersea operations
3. Support for humans in, on, and out of the loop with a microservices-based modular architecture, allowing service migration during Uncrewed Maritime Vehicle (UMV) missions
4. Responsive and secure ship-to-shore communications
5. Enabling future requirements, such as UxV teaming/swarming

Another significant challenge with maritime systems is that the “network” is frequently a single tether or radio link where all the data, regardless of type, is treated the same. Connex features, such as Real-time WAN Transport and fine-grain QoS, provide an efficient way to handle different data as its own flow.

A SYSTEM OF SYSTEMS (A Single Scalable Architecture)

Today, UxVs are very sophisticated, utilizing system-level components to create and manage a coordinated group of vehicles, each with their own systems, working together to complete a mission. Connex provides real-time scalable architecture within the vehicle and components that allow DDS to interoperate at different levels across multiple systems.

Connex allows developers to use the same data model and API from sensors down in the UxV and up to the cloud. This avoids the confusion of working with many different protocols in the embedded systems in the vehicle, other protocols in the TeleOp station, and still others across the WAN and in the cloud. At each level, there would be translations of protocols and data representation, with the need for different APIs (and potentially different programmers). With Connex, the same model, and the same API, works everywhere and makes all the levels work together as one.

RTI CONNEXT DRIVES MISSION SUCCESS

RTI Connex enables the development of autonomous maritime systems and UMVs using a MOSA approach that enables the rapid insertion of new capabilities. Connex delivers rapid integration and mission readiness while increasing the maintainability of vehicle assets. Connex also enables rapid reconfiguration for different mission roles while improving vehicle reliability and reducing operational training time. Connex includes a rich set of tools that accelerates module- and system-level development, debugging, testing, integration, and optimization. RTI tools provide the ability to visualize system modules and view interconnectivity and system health, as well as introspect and inject data.

Connex is a complete product suite that helps save time, reduce code, optimize efficiency, and increase productivity when developing software-defined maritime systems.

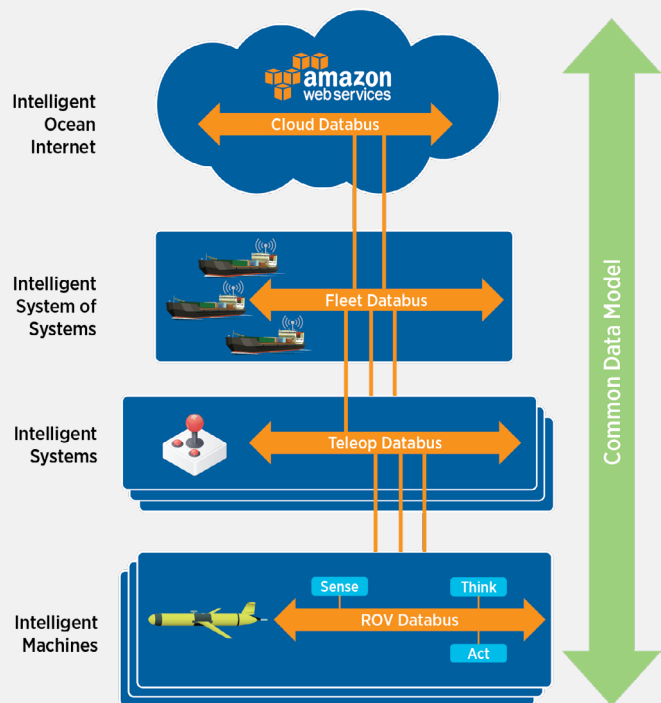


Figure 1. System of Systems

ABOUT RTI

Real-Time Innovations (RTI) is the infrastructure software company for smart-world systems. Across industries, RTI Connex® is the leading software framework for intelligent distributed systems. RTI runs a smarter world.

RTI is the market leader in products compliant with the Data Distribution Service (DDS™) standard. RTI is privately held and headquartered in Silicon Valley with regional offices in Colorado, Spain, and Singapore.

RTI, Real-Time Innovations and the phrase “Your systems. Working as one,” are registered trademarks or trademarks of Real-Time Innovations, Inc. All other trademarks used in this document are the property of their respective owners. ©2023 RTI. All rights reserved. CB-036 V1 0224

2 • rti.com