CAPABILITY BRIEF

# RTI Connext for the Unmanned Maritime Autonomy Architecture (UMAA)

USING MODULAR OPEN SYSTEMS APPROACH (MOSA) TO ACCELERATE
THE NEXT GENERATION NAVY

## HIGHLIGHTS

Delivers real-time software connectivity framework for the UMAA Autonomy Bus

Promotes Modular Open Systems Approach (MOSA) to isolate and decouple services

Efficient technology designed for rapid insertion, maintainability and extensibility capabilities

Proven mission-critical connectivity framework deployed in every modern surface ship in the U.S. Navy

Based on the open Data Distribution Service (DDS™) standard

Supports all 14 UMAA Quality Attributes called out in the UMAA Architecture Document and can communicate up to TOP-SECRET security level

RTI Connext® implements the UMAA Autonomy Bus as defined in the UMAA Architecture Document, and provides fast, scalable, reliable, and secure connectivity for on- and off-vehicle communications in real-time. Through its integration with UMAA-based designs, Connext enables rapid system updates and mission readiness, while driving down system maintenance costs.

## NEXT-GENERATION DISTRIBUTED MARITIME SYSTEMS

The creators of unmanned and autonomous maritime systems face unique challenges in an operational environment that is constantly evolving with new technologies and threats. Meeting these challenges requires an expansive list of mechanical systems, sensors, and effectors, which need to adapt quickly to both the environment and to evolving threats developed by adversaries.

To meet these challenges, 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 Unmanned Vehicle (UMV) missions

4. Responsive and secure ship-to-shore communications

5. Enabling future requirements, such as UxV teaming/swarming

## UMAA: A NEXT GENERATION AUTONOMOUS NAVAL ARCHITECTURE

The Navy's Unmanned Maritime Autonomy Architecture (UMAA) defines a set of fundamental autonomy services for Unmanned Maritime Vehicles (UMVs) and Unmanned Undersea Vehicles (UUVs). The figure below depicts a functional decomposition into seven core functions of the UMAA standard and representative capabilities within them. These standardized groups of services are connected via a common autonomy bus, which is managed by the Object Management Group® (OMG®) Data Distribution Service (DDS™) standard that is the foundation of the RTI Connext product line.

UMAA also defines a comprehensive common data model, making the data shared between these services the actual interface between them, enabling UMV / UUV services to communicate using natural data types that accelerate real-time situational awareness, control response, and mission quality. The UMAA Autonomy Bus ensures data within the vehicle is delivered from any source and made locally available to any consumer in real-time.

## RTI CONNEXT CONNECTIVITY FRAMEWORK FOR AUTONOMOUS SYSTEMS

RTI Connext provides fast, scalable, reliable and secure connectivity within and between land, sea, air and space systems. Based on the open DDS standard, Connext supports both airborne platform industry standards and evolving autonomous industry platforms. Connext can help accelerate UAM system development and the rapid integration of both new and legacy UM assets.

Because these autonomous underwater systems must operate in real time, UMAA platforms need to ensure data is delivered within bounded deadlines. This can be accomplished using the robust Quality of Service (QoS) capabilities available in Connext.
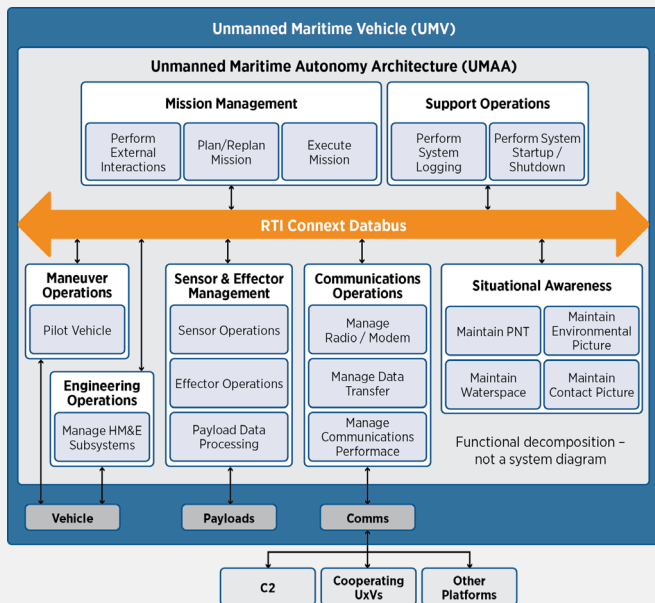


*Figure 1*

## SECURE UMAA COMMUNICATIONS

UMAA-based UUVs require off-vessel communications in open maritime zones where adversaries also roam. It is therefore imperative that wireless communication with other UMAA systems needs to ensure the security, confidentiality, and integrity of the data as it flows across the mission operations theater.

To meet these stringent UMAA requirements, Connext enables the ability to select advanced algorithms to maintain security at a higher level. By selecting these new algorithms, Connext applications can operate in TOP-SECRET security levels, as defined by CNSSP-15.

RTI Connext is the first commercial solution to comply with the open DDS Security (DDS-SECURITY™) Specification and provides UMAA participant authentication, role-based access control per topic of data, encryption, data tagging and event logging, all without modifying the existing DDS network infrastructure.

In addition, Connext is uniquely able to ensure data confidentiality and integrity, while protecting data-in-motion information across multiple security domains from unauthorized access and tampering by adversaries. This is accomplished by creating data-centric "Zero-Trust" security networks that can apply fine-grained authentication and encryption to individual data elements, enabling the sharing of network resources across multiple UMAA systems and security domains.

## RTI CONNEXT DRIVES UMAA MISSION SUCCESS

RTI Connext enables the development of autonomous maritime systems and UMVs using a MOSA approach that enables the rapid insertion of new capabilities. Connext delivers rapid integration and mission-readiness, while increasing the maintainability of vehicle assets. Connext also enables rapid reconfiguration for different mission roles, while improving vehicle reliability and reducing operational training time.

Connext includes a rich set of tools that accelerate 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 into military ground vehicle systems.

### COMPLIANCE

DUNS: 797735883
CAGE: 03FH8

NAICS Codes:
- 511210 Software Publishers
- 541511 Custom Computer Programming Services
- 541512 Computer Systems Design Services

**Learn how to create an anchor controller app for a UMAA system in our Case + Code example at www.rti.com/case-code-umaa.**

## ABOUT RTI

Real-Time Innovations (RTI) is the infrastructure software company for smart-world systems. Across industries, RTI Connext® 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.

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