The Internet of Things demands a new integration approach. Legacy architectures and technologies simply cannot cope with the diversity of applications and volume of data. With RTI® Connext™ DDS Professional you can break through these barriers. A next-generation communications platform, it unleashes the value of distributed real-time data by making it accessible across an enterprise—where and when it is needed.

The increasing interconnection of devices and systems poses several significant challenges:

- Scaling development across teams and achieving interoperability between independently developed software components
- Efficiently distributing and managing the resultant volume of data while maintaining low latency and determinism
- Connecting applications deployed across devices, data centers and the cloud

Connext DDS is designed specifically to address these challenges of big data in motion, Machine-to-Machine (M2M) communication and System of Systems integration. It includes a rich, Data Distribution Service (DDS) compliant communications infrastructure along with powerful development, integration and testing tools.

Connext DDS is the only solution that combines extremely loose coupling with ultra-high performance and scalability. As a result, it eliminates the need for custom messaging approaches and complex integration logic. This dramatically reduces the cost of developing, integrating and evolving performance-critical, large-scale and intelligent systems.

New in Connext DDS 5.1

Focusing on improved usability and scalability, Connext DDS 5.1 delivers over 60 new features, including more than 30 predefined QoS profiles, dynamic prototyping with Lua and XML-based application creation. It also supports over 20 new platforms, as well as Mutable Types and Optional Members (compliant with DDS-XTypes).

Highlights:

- Interoperable across languages, operating systems, CPU families and network types
- Well-defined component interfaces for rapid integration
- Low latency and high throughput
- Deterministic even under load and at scale
- Reliable multicast for efficient data distribution
- Peer-to-peer architecture with no message brokers or servers
- Non-stop availability with live upgrades and no single point of failure

RTI Connext DDS Libraries

- C, C++, C#/.NET, Java and Ada
- Unmodified Existing Apps
- RTI Connext DDS Libraries
- RTI Adapter

RTI Adapter

Shared memory, LAN, WAN, Internet
**Connext DDS Libraries** implement the core communication capabilities and provide DDS and JMS programming interfaces.

**Secure and WAN Transport** provides authentication and encryption over local and wide area networks using OpenSSL, TLS and DTLS.

**Routing Service** bridges data across networks and security domains — for example, between an intra-node shared memory network and an Ethernet LAN or between multiple LANs over the Internet. It also mediates between applications that use incompatible data models.

**Adapter SDK** extends RTI Routing Service to integrate unmodified existing applications that use interface technologies other than DDS. It includes example adapters for JMS, network sockets and files.

**Database Integration Service** synchronizes real-time data with a relational database for interoperability with applications that use SQL.

**Web Integration Service** provides a REST/HTTP interface to enable easy integration with web applications and scripting languages.

**Recording Service** records high-throughput data for future analysis and debugging. Recorded data can also be replayed for testing and simulation.

**Persistence Service** makes data available to late-joining consumers even if the original producer is no longer accessible. It also offloads reliability protocol overhead from CPU limited producers or those connected over bandwidth-constrained networks.

**Spreadsheet Add-in** allows you to use Microsoft Excel to display, visualize and write-back RTI Connext data.

**Prototyper** lets you quickly simulate system components to test your applications and assess scalability before development is complete.

**Administration Console** is a centralized tool for monitoring, configuring and debugging Connext DDS infrastructure services. It allows users to view system-wide logging messages and provides non-intrusive visibility into a running system — including nodes, participants, topics, types, and QoS. A new Match Analyses capability actively identifies incompatibilities inhibiting communication.

**Monitor** allows you to easily diagnose performance problems and tune your system. It displays comprehensive performance, health and resource utilization statistics.

**Distributed Logging Library** allows your applications to publish log messages to RTI Administration Console and RTI Recording Service.

**Wireshark** captures and displays user data and Connext DDS metadata to aid in the diagnosis of network-level connection and timing issues.
Powerful Data-Centric Paradigm

Connext DDS simplifies application and integration logic by offering more capability than traditional messaging solutions. Instead of exchanging messages, software components communicate by sharing data objects. Applications operate directly on these objects (create, read update and delete). Developers do not have to deal with low-level messaging or networking interfaces. Connext DDS handles the details of data distribution and management, including serialization and lifecycle management.

Connext DDS provides for data in motion what a database provides for data at rest:

- **Decoupling.** Data producers are agnostic to the number of consumers and the type of processing they do. This allows components to be added and changed without affecting those that are already deployed.
- **Easy integration.** The interfaces in a system—as defined by the data model—are explicit and discoverable. Integration requires no knowledge of a component’s implementation and you do not need to reverse engineer protocols and messages.
- **Robustness.** Connext DDS maintains a system’s shared state, providing a single source of truth. Late and re-joining applications automatically synchronize with the current state. This ensures applications have a consistent world view even in dynamic and large-scale environments.

Unlike a traditional database, Connext DDS is a completely decentralized DataBus. Data is cached in each application. Updates are published peer-to-peer to subscribing components. Applications can receive asynchronous update notifications or poll for the latest value as needed.

Enterprise Integration Patterns

In addition to data-centric publish-subscribe, Connext DDS supports additional patterns to ease development.

- **Request/Reply.** Components issue requests or commands to others, with replies automatically correlated to the original requests. Connext DDS can issue a single request to multiple components and correlate multiple responses to a single request—for example, to track the execution status of a command. This is more flexible than basic remote procedure call (RPC) and remote method invocation (RMI) implementations.
- **Durable Subscriptions.** Connext DDS can retain all updates to a data object—not just the pre-configured history—until they are acknowledged by a specified set of subscribers.
- **Application-Level Acknowledgement.** Updates are not considered delivered until they are processed by the receiving application. This ensures critical data or commands are not lost if the recipient fails between receiving and processing the update.

DDS Compliance

Connext DDS complies with the Object Management Group (OMG) Data Distribution Service for Real-Time Systems (DDS) standard. It supports both the DDS Application Programming Interface (API) and network interoperability protocol (DDSI-RTPS).

DDS is the only messaging standard designed specifically to meet the requirements of timing-critical systems. It can deliver over 50x the performance of IT standards such as JMS, MQTT, AMQP, XMPP and Web Services. For applications with demanding requirements, DDS is often the only standards-compliant alternative to proprietary or custom integration approaches.

Connext DDS is the world’s leading DDS implementation with more than 70% commercial market share. RTI has worked hand-in-hand with hundreds of customers to successfully deploy some of the world’s most critical distributed systems. This unparalleled expertise in applying DDS to real-world problems makes RTI the best partner for your DDS project.

“Explicit integration interfaces and standards compliance make Connext DDS the ideal platform for Open Architecture systems.”
Optimized for Performance, Scalability and Availability

Peer-to-peer communication does not require servers, services or message brokers. This decentralized architecture delivers:

- Minimum latency with no intermediate software or gratuitous network hops
- Maximum throughput and scalability with no broker or daemon process acting as a choke point
- Non-stop availability with no single point of failure
- Easy embedding with no required services that must be started and administered
- Inherent security with support for operating system level policy enforcement and no single point of vulnerability

Automatic discovery eliminates the need for deployment-time configuration. Applications are plug-and-play, facilitating use in dynamic networks. Connext DDS automatically discovers and routes data between matching producers and consumers at run-time; systems are self-forming and self-healing.

Smart filtering maximizes efficiency and scalability. Connext DDS can filter by specific content (not just metadata) and desired frequency of delivery, simplifying logic. Filters are applied on the publisher side to reduce network and processor overhead. In addition, when bridging networks, Routing Service only forwards currently subscribed data.

Reliable multicast provides scalable one-to-many and many-to-many data distribution. Messages only have to be sent over the network once, regardless of the number of subscribers. Connext DDS includes an optional multicast reliability protocol optimized for real-time behavior.

Quality of Service control allows you to optimize tradeoffs between latency, throughput and CPU and network overhead. The frequency, timeliness and reliability of data delivery are configurable per-stream and component. This eases integration of applications with disparate performance needs, such as real-time and IT applications. Applications are also notified if timing deadlines are missed so they can take remediating action.

Automatic failover between publishers and networks provides uninterrupted availability in the event of hardware and software failures.

Transport protocol independence allows applications to communicate seamlessly over a wide variety of network types, from shared memory to low-bandwidth radio networks. Connext DDS does not require TCP, IP or network-level reliability.