



PROVEN DATA CONNECTIVITY STANDARD FOR THE IOT™

Introduction

The Data-Distribution Service™ (DDS™) is the proven international standard for data-centric connectivity from the Object Management Group® (OMG®). It integrates the components of a system together, providing low-latency data connectivity, extreme reliability, and a scalable architecture, making it ideal for industrial applications from smart transportation, smart factories, health-care, smart cities and smart energy.

DDS is uniquely **data-centric**. The essence of data centricity is that DDS understands the data it manages and controls how to share that data. Programmers using traditional message-centric middleware must write code that sends messages. Programmers using data-centric middleware write code that specifies how and when to share data and then directly share data values. Rather than managing all this complexity in the application code, DDS directly implements controlled, managed, secure data sharing.

Proven in Many Existing IoT Systems

DDS is already well-proven in many operational industrial IoT applications. Users can reliably and securely harness ever-increasing amounts of device-generated data and process the data in real-time, and then act on events as quickly as they occur. As a result, DDS enables smarter decisions, new services, additional revenue streams, and reduced costs.

The table below compares DDS with other protocols that are often considered for industrial IoT applications. It shows that DDS is a feature-rich standard that transparently handles much of an industrial IoT system's data connectivity complexity, thereby easing developer efforts.

	Transport	Paradigm	Scope	Discovery	Content Awareness	Data Centricity	Security	Data Prioritisation	Fault Tolerance
AMQP	TCP/IP	Point-to-Point Message Exchange	D2D D2C C2C	No	None	Encoding	TLS	None	Impl. Specific
CoAP	UDP/IP	Request/Reply (REST)	D2D	Yes	None	Encoding	DTLS	None	Decentralised
DDS	UDP/IP (unicast + mcast) TCP/IP	Publish/Subscribe Request/Reply	D2D D2C C2C	Yes	Content-Based Routing, Queries	Encoding, Declaration	TLS, DTLS, DDS Security	Transport Priorities	Decentralised
MQTT	TCP/IP	Publish/Subscribe	D2C	No	None	Undefined	TLS	None	Broker is the SPOF

D2D: Device-to-Device D2C: Device-to-Cloud C2C: Cloud-to-Cloud

QUALITATIVE COMPARISON OF IOT STANDARDS

Advantages of Choosing DDS

The DDS standard simplifies the development, deployment, and management of IoT applications, speeding time-to-market. It provides:

- **Ease of Integration:** The DDS data-centric approach allows the definition of common and extensible data models for seamless Information Technology (IT) / Operational Technology (OT) interoperability.
- **Performance Efficiency:** DDS implementations can achieve point-to-point latencies that are as low as 30 µsec. and throughput of several million messages per second.
- **Scalability:** The DDS architecture is scalable from small devices to the cloud, connecting thousands of devices and systems while spread across multiple continents and in space, delivering data at ultra-high speed.
- **Advanced Security:** The DDS Security specification defines a comprehensive Security Model and Service Plugin Interface architecture for compliant DDS implementations.
- **Open Standard:** The DDS specification is a mature, proven standard open to participation by both vendors and users. It enables end-to-end vendor interoperability and eases IoT system development and integration through fully open, future-proof APIs with no vendor lock-in.
- **QoS-Enabled:** A rich set of QoS policies allows DDS to control of all aspects of data distribution, such as timeliness, traffic prioritization, reliability and resource usage.
- **Scalable Discovery:** For large-scale dynamic systems, DDS offers automatic discovery that provides plug-and-play functionality to simplify system integration and orchestration.
- **Widely Supported:** DDS implementations support multiple programming languages, operating systems, and hardware platforms, from cloud servers to mobile devices, to DSP's, PLC's, and microcontrollers.
- **Applicability:** DDS can transparently address device-to-device, device-to-cloud, and cloud-to-cloud communication.

DDS: The Right Choice

IoT systems have diverse communication needs, but it's better and easier to use a single communication paradigm when possible. System designers should determine which of the diverse IoT device protocols meets the primary challenge of their intended applications. Overall, DDS is the most versatile of these protocols. It can manage tiny devices, connect large, high-performance sensor networks and close time-critical control loops. It can also serve and receive data from the cloud.

DDS communication is peer-to-peer. Elimination of message brokers and servers simplifies deployment, minimizes latency, maximizes scalability, increases reliability, and reduces cost and complexity. It is ideal for IoT applications that require a lasting, reliable, high-performance architecture.

For more information about the DDS standard, please refer to <http://portals.omg.org/dds>.

Want to learn more?

We would be happy to discuss how OMG membership would benefit your organization! Please feel free to explore our website at www.omg.org and when you are ready, please contact bd-team@omg.org, or +1-781-444 0404 to get started.

About OMG

The Object Management Group® (OMG®) is an international, open membership, not-for-profit computer industry standards consortium. OMG Task Forces develop enterprise integration standards for a wide range of technologies and an even wider range of industries. OMG's modeling standards enable powerful visual design, execution and maintenance of software and other processes. Visit www.omg.org for more information.



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