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THE POWER OF **NOW**

CONNECT

Standardize Connectivity to Devices, Applications, and Systems for a Centralized Source of IIoT Data

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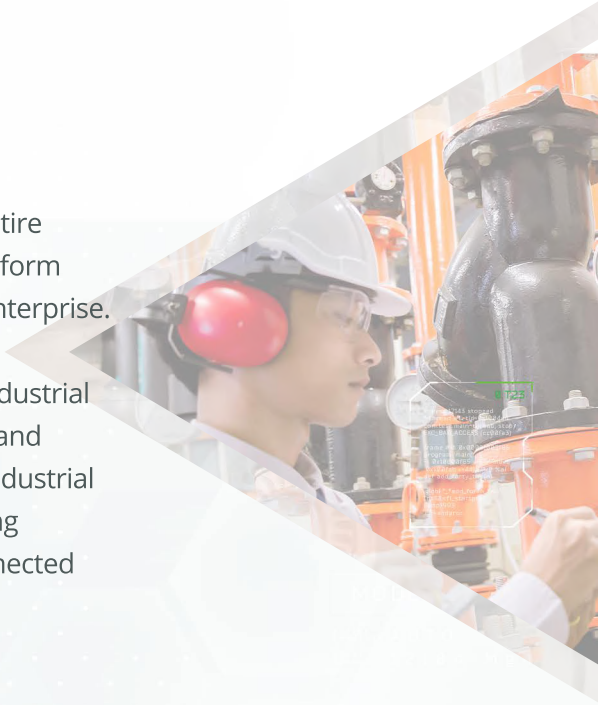
The key to success for any industrial IoT implementation is frequently determined by the extent of interoperability between the IIoT platform and the devices, systems, and processes throughout the enterprise.

The "things" that make up an industrial enterprise– factory equipment, machines, hardware, tools, assets in the field – represent a rich source of valuable data that has remained largely untapped. IIoT solutions enable connectivity to things to access data – and then communicate that data back to the enterprise where it can be used, stored, or integrated into other applications and systems.

But connectivity in an industrial setting is often wrought with challenges, as many operations remain teeming with disparate or legacy devices and ad hoc systems.

Most businesses are not in a position to replace entire fleets of equipment, and thus, seek out an IIoT platform solution to facilitate digital transformation in the enterprise.

The ThingWorx IIoT Solutions Platform connects industrial assets to derive data directly from devices, assets, and enterprise systems, providing a single source for industrial operations data. ThingWorx provides the underlying connectivity infrastructure essential to getting connected and scaling IIoT solutions quickly.



ThingWorx Makes It Possible to:

- Access industrial IoT and application data from on-premise web servers, off premise cloud applications, and hybrid environments
- Eliminate issues with latency, cost, and security using edge computing capabilities to collect and aggregate data at the source
- Operationalize industrial data to extract actionable insights within minutes via integration with platform components and third-party systems
- Meet site security requirements with secure, authenticated, and encrypted communications across varying network topologies via SSL and TLS

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Solution Capabilities

Connectivity

ThingWorx offers the broadest range of drivers available, supporting current and legacy devices, wired and wireless network mediums, and connectivity to databases, software applications, and other OPC servers.

Aggregation

A single point of entry connects to thousands of data sources and provides information to hundreds of applications, eliminating the need for multiple, disparate applications to enable discrete connectivity.

Optimization

ThingWorx uses data conditioning and reduction, customized load balancing, and protocol-specific optimization to improve communications and reduce network and device load through data conditioning and reduction, which minimizes bandwidth and resource utilization by providing only the most critical updates.

Accessibility

Access to platform components, client applications (like MES and SCADA), IoT, and other big data and analytics software is enabled through ThingWorx AlwaysOn protocol, OPC, proprietary protocols, and IT protocols.

Diagnostics

Robust communication diagnostics isolate device and application communications for troubleshooting, including OPC diagnostics for real-time and historical views of OPC events and communications diagnostics to capture the protocol frames transferred between the server and a device.

ThingWorx Connection Services

Secure, embeddable, and easily deployable communications designed for connecting sensors, devices and equipment across any network topology and any communication scenario, including:

- ThingWorx Connection Server - A server application that allows the connection of remote devices and handles all message routing to and from the devices
- ThingWorx Azure IoT Hub Connector - Out-of-the-box (OOTB) functionality connects to Microsoft® Azure® IoT Edge devices and provides access to Azure services directly from ThingWorx - including the ability to remotely update software for connected devices - creating a single, seamless user experience.
- ThingWorx Protocol Adaptor Toolkit - Provides a secure communication infrastructure between an edge device and ThingWorx

ThingWorx Flow

With a complete set of OOTB system tools and connectors, ThingWorx Flow dramatically reduces the time and skill level required to connect enterprise systems and devices to orchestrate flows of information among them. ThingWorx Flow empowers a new, broad set of users with the business knowledge, but without programming skills, to create, understand, and modify connections and flows.

- System-Specific Connectors – Supported systems include Microsoft Azure, SAP, Salesforce, Windchill, Box, and more
- Standards-based connectors – For systems that support one or more standards, including SQL, OData, Swagger, HTTP, RAML, SOAP, and OSLC

ThingWorx Edge

ThingWorx Edge uses secure, real-time connection capabilities to reduce development time with multiple connectivity options that are firewall-friendly and easily deployable. ThingWorx Edge consist of:

- ThingWorx Edge MicroServer (EMS) - Pre-built, full-featured, lightweight IoT Gateway application that communicates directly with Edge components, directly on the device, on a gateway talking with the device, or through a network interface
- ThingWorx Edge SDKs - Complete set of libraries for building connectivity into a single standalone device or gateway, using various languages including Java, C, .NET, iOS, and Android
- ThingWorx Kepware Edge (TKE) - Connectivity server that enables users to connect diverse automation devices and sensors to a wide variety of digital solutions
- ThingWorx Kepware Server (TKS) - Provides standardized, industrial connectivity that supports a wide depth and breadth of disparate assets

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Security

The ThingWorx platform, which is open and extensible in nature, utilizes a shared responsibility model for security. ThingWorx enables users to applications that are flexible and provides a range of extensions from partners to add additional security measures as they see fit.

Security of Data in Motion:

- Use standard protocols securely within strong, firewall-friendly architecture
- Eliminate unauthorized access using secure, agent-initiated communications
- Encrypt communications in transit

Remote Device Visibility and Control:

- Interrogate the state of remote devices and control operations
- Authenticate edge devices
- Defeat devices outside administrative control

Software Content Management:

- Interrogate the state of remote devices and control operations
- Authenticate edge devices
- Defeat devices outside administrative control

Granular Authorization Control:

- Control read/write permissions via templates down to individual properties level
- Define organizational construct
- •Authorization Control

Existing Authentication Investments:

- Build on existing security infrastructure using pluggable authentiation, including LDAP, active directory, and customized options
- Use native authentication for small projects
- Implement complex single

Accounting and Auditability:

- Log relevant events to support industry audit requirements with adaptable logging sub-system

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