FDI Technology

DIGITAL TRANSFORMATION THROUGH FIELD DEVICE INTEGRATION

ONE device — ONE package — ALL tools
INTEROPERABILITY: THE KEY TO DIGITAL TRANSFORMATION

Value Creation Through Integrating Intelligent Field Devices in Automation Solutions

Many of today’s field devices function more like embedded computers than transmitters of physical process values. They are intelligent, microprocessor based devices that offer a wealth of data not previously available. They are connected via sophisticated communication networks to complex control systems and beyond. And they generate much more data about both the process being managed and their own status than ever before. But taking advantage of this data is a challenge. First, the data must be made accessible to multiple plant floor and enterprise IT systems. Then, data must be processed and converted to actionable and visible information. And as software and systems upgrade, configuration and maintenance becomes an ongoing process to manage. In this environment, the need for a universal, standardized and interoperable model to comprehensively describe and manage automation components becomes a necessity. It is vital for everyday purposes like device configuration, device replacement, maintenance, diagnostics and audit trails – all essential building blocks in a modern field device management system. This description must be usable for all systems, independent of suppliers of devices, systems or tools. Without it, the true potential of decentralization, transparency, integration and a central view of all data and functions cannot be fully realized.

Digital Transformation: The act of leveraging digital connectivity, scalability, analytics, and re-imagined business processes to dramatically improve operational efficiency, safety, and value creation.

Field Device Integration Technology (FDI) – Evolution Rather Than Revolution

The roots of FDI technology date back to the 1980s, when Device Descriptions first became popular. As both device and system technology became increasingly complex, Devices Descriptions and the tools used to create them evolved to incorporate more and more sophisticated features. Windows-based FDT/DTM architecture diverged from text based EDDL designs. System suppliers generally support one architecture or the other. Devices vendors are forced to support both.

End users began demanding a single solution as procurement, configuration and maintenance costs escalated. So in 2007 the FDI standardization project was launched to carefully shape convergence of FDT/OTM and EDDL architectures.

In 2011 a non-profit organization, the FDI Cooperation LLC, was created to manage the standardization process for a converged device integration technology. In 2015, after being standardized as IEC 62769-1, the FDI Cooperation transferred ownership, management and enhancement of the standard to FieldComm Group and PROFIBUS & PROFINET International.

THE INDUSTRIAL INTERNET OF THINGS

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The primary objective of FDI is to dramatically simplify software installation, configuration, maintenance, and management of field instruments and host systems. Today’s field devices often include a device information file such as an EDD or a DTM that provides software access to the features and functions of the device, one or more user interface plug-ins that integrate with host system software to enhance usability of the field device with the host, numerous user manuals, installation instructions and data sheets.

FDI brings standardization to the packaging and distribution of all the software and tools necessary to integrate a device with a host system. All registered FDI devices will have an associated FDI Device Package.

**Before FDI**

- 200+ downloadable files available for a common flowmeter

**FDI**

- 1 FDI Device Package per protocol

**FDI Device Packages + Hosts + Registration = Stress Free Integration**

01 **FDI DEVICE PACKAGE**

The FDI Device Package is a single software module that contains all tools, device information, and user interface plug-ins needed for the device.

02 **FDI HOST**

An FDI host is a software component that operates with FDI Device Packages. Host examples include dedicated products such as handheld communicators, device management software, plant asset management systems, historians, and analytics packages.

03 **REGISTRATION**

Products bearing the FDI Registered mark undergo a series of rigorous tests administered by FieldComm Group, ensuring a consistent level of functionality and interoperability regardless of the host system.

FDI is a system-wide solution. Host systems, like asset management systems, configurators, and device managers must support the FDI client-server architecture. Field device suppliers must encapsulate device specific software and documentation into an FDI Device Package. Finally, product registration service providers, like FieldComm Group, must deliver high quality conformance testing, registration, and FDI Device Package distribution services. When host systems, FDI Device Packages, and high-quality registration are combined, end users can take advantage of a truly stress free device integration solution.
FDI DEVICE PACKAGES - THE CORE OF FDI

The FDI Device Package is the core component of an FDI enabled system. An FDI Device Package is a single file that includes drivers, interfaces, certificates and documentation.

FDI HOSTS

FDI Device Packages are imported by FDI hosts, allowing users to operate the device. An FDI host can be a stand alone software component, an integrated software component in a distributed control system or a software component with a client server architecture. FDI host examples include dedicated products such as handheld field communicators, standard software components of a distributed control system like the device management software or optional software systems such as plant asset management systems, historians, and analytics packages.

An FDI host typically consists of an FDI client, an FDI server and one or more FDI communication servers.

- The UI Engine ensures that user interface elements of the FDI Device Package, the UID and UIP, are executed in the same way in various host systems.
- An Information Model interacts with Device Model Services (included in FDI Common Host Components) which retrieves EDD information from the EDD Engine.
- The EDD Engine supports the entire scope of EDDL in a multiprotocol manner, in accordance with IEC 61804. It is backward compatible with existing EDD formats.
- The Communication Server natively supports standard protocols like HART, PROFIBUS, PROFINET and Foundation Fieldbus. Additional communication paths can be integrated by communication servers, for example, an OPC UA communication server.
Millions of devices worldwide are currently installed, configured, operated, managed, and maintained by control systems and tools that support either the EDDL or FDT standards.

Any convergence standard must acknowledge the installed base, be designed for flawless interoperability and provide a seamless, scalable and standardized approach to accessing data. FDT technology meets the challenge. It is designed to support FDI Device Packages as well as DTMFs and EDDs in parallel.

FDI tool supporting FDI

One way to enable an FDT host to support FDI Device Packages is through an FDI-DTM. In this system an ability to process an FDI Device Package is added while components like user interface and communication interfaces remain unchanged.

Migration of new standards

EDDL has been standardized and harmonized, but new innovations and market requirements will continue to drive changes to the EDDL standard. FDI manages such innovations very easily and is designed to accommodate such changes. For example, the FDI Common Host Components may be updated to incorporate these changes and provide access to new functionality while guaranteeing backward compatibility. After integration of these new components in an FDI host by the host supplier, the new standard is supported and the user can enjoy the benefit of the innovation.
INDUSTRY LEADERS SUPPORT FDI

**ABB**
For ABB, FDI is the key technology to overcome the ever repeating efforts for integrating field devices into control systems and assure optimal device configuration. Additionally, FDI is the migration path for traditional field instruments into the Internet of Things. ABB started product implementation early and released the first FDI-based product, Field Information Manager, in mid 2015. In three minutes, users can start managing their devices using this product. The second version of the product is now available, providing additional functions for easy device management and supporting the use on handhelds.

- **Dr. Wilhelm Otten, President**

**Endress+Hauser**
Our customers are demanding an integration technology, which can fulfill their need for reduced life cycle cost of field devices, from installation to replacement. Seamless interoperability and data transparency on all levels are key factors in customer acceptance of upcoming technologies. As an FDI pioneer, Endress+Hauser has supported customers from the first specification, leading up to the first implementation of the technology for field instruments. Endress+Hauser is committed to serve customers with the latest integration technology and bring them the best possible value.

- **Dr. Rolf Birkhofer, Managing Director**

**Emerson**
Moving to a single technology for configuration, maintenance, alarm visualization, and data access of smart field equipment is imperative for the automation industry. This will provide a reduction of tools, cost savings, consistent interfaces, and ease of use for both manufacturers and end users. Emerson has incorporated all the best capabilities of the approaches that have been used before in this area, moved them to the latest technologies, added new features, and is ready to fulfill this role. Emerson is fully committed to implementing FDI technology across our portfolio.

- **Thoralf Schultz, Global Technology Manager**

**FieldComm Group**
FieldComm Group's mission is to develop, manage and promote global standards for integrating digital field devices into automation system architectures while protecting process automation investments in HART and FOUNDATION Fieldbus communication technologies.

- **Honeywell**
Honeywell Process Solutions is a charter member of the effort to reconcile differing device integration methods into a unified approach - FDI. The value of FDI is especially realized by end-users, in that devices across the spectrum of industrial standards such as HART, FOUNDATION Fieldbus, and PROFBUS can be engineered and maintained with a common, system and device independent, set of tools. Equally important, FDI marries the simplicity and platform independence of EDDL with the powerful functionality of FDT, in a seamless manner, providing the end user with an open, future-proof standard for integration and superior user experience. Honeywell actively plans uniform adoption of FDI in its SmartLine instruments, Experion® DCS and its Field Device Manager asset management suite.

- **Paul McLaughlin, Chief Engineer**

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- **Paul McLaughlin, Chief Engineer**

**SIEMENS**
As a complete supplier of host systems and field devices, Siemens has always played a pioneer role in the development of FDI. The Process Device Manager Simatic PDM was our first prototype utilizing FDI functionality. This tool already worked with FDI Device Packages in 2013. Siemens will release the first FDI host system and corresponding FDI Device Packages in 2017. We consider FDI as a decisive step towards less complexity and optimized customer service and will continue to strengthen the joint activities accordingly.

- **Axel Lorenz, Vice President, Process Automation**

**Yokogawa**
Yokogawa has played a key role in the development of FDI technology, from specification to design, including development of its Integrated Development Environment (IDE). Our contributions include the creation of the first sample FDI Device Package in 2014. We also led the development of the Reference Run Time Environment (RTE) for FDI hosts. Based on market demand, Yokogawa is now co-innovating with its customers to develop and release FDI-compatible versions of host systems such as the FieldMate device management tool and Plant Resource Manager (PRM), as well as FDI Device Packages.

- **Shinji Oda, Chief Standards Officer & General Manager for Technology Marketing**

**FDI Device Package**
A collection of software components that provide all the information necessary to integrate a type of design into a system.

**FDI Server**
A host system software component that implements the Information Model, executes Business Logic, and communicates with devices.

**Business Logic**
Descriptive element of an FDI Device Package that specifies device behavior and mapping logic for communication.

**FDI Client**
A host software component that uses the Information Model, interprets User Interface Descriptions and hosts User Interface Plug-ins

**Information Model**
Set of objects, variables and methods rendered by an FDI Server

**User Interface Description (UID)**
Descriptive element of an FDI Device Package that is used by an FDI Client to render user interfaces

**User Interface Plug-In (UIP)**
Executable element of an FDI Device Package executed by an FDI Client

**FDI Communications Server**
An OPC-UA server used by and FDI Server to access non-native networks.