



FIELDCOMM GROUP™
*Connecting the World of
Process Automation*



Enhancing Your Investment in FDT® with FDI

White Paper



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FieldComm Group
9430 Research Boulevard
Suite 1-120
Austin, TX 78759 USA

Phone: +1 (512) 792-2300

fieldcommgroup.org



FDT Group AISBL
5 Industrieweg
3001 Heverlee
Belgium

Phone +32 10 22 22 51

fdtgroup.org

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Introduction

Co-developed by major industry leaders and manufacturers, FDI brings new IIoT/Industrie4.0 technology to the management of smart devices in the Process Automation industry. It is the next generation, unifying device integration technology. 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 rely on device information files such as an EDD or a DTM™ to provide access to the features and functions of the device. FDI brings standardization to the packaging and distribution of all the software and tools necessary to integrate a device with a host system.

In order to enhance the current investment in FDT based solutions, use FDI Device Packages.

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Who Should Read This White Paper

This paper will benefit technology-aware end users, EPCs and automation design engineers.

Executive Summary

This paper provides a discussion of how FDI technology can be used with FDT based systems.

The paper is organized into the following sections:

- Introductory information for users who are new to FDI or FDT technology
- A review of the technologies and a description of how they are complementary
- An outline of benefits to users and manufacturers who use FDI Device Packages with FDT

Key Takeaways

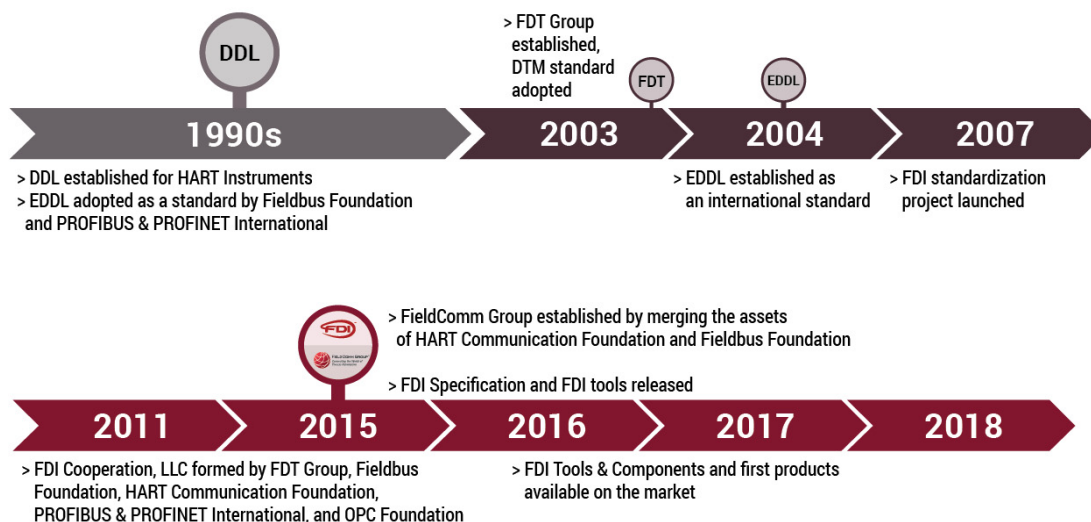
- The FDI Device Package is designed to be a single package with all files necessary to operate a device of a given protocol, independent of host system.
- For native FDI host systems, FDI Device Packages are imported to the host and are operating system independent.
- For FDT based host systems, FDI Device Packages are integrated with the FDT application through an FDI DTM.
- By using FDI Device Packages and FDT applications, the need for specific Device DTM's for process automation field devices is greatly reduced.

The FDI Cooperation, a consortium of leading process automation suppliers created the FDI standard to simplify device management. FieldComm Group now co-owns and manages the standard.

FDI Anthology

The roots of FDI technology date back to the 1980s, when Device Descriptions (DD) first became popular. As both device and system technology became increasingly complex, DDs and the Electronic Device Description (EDDL) tools used to create them evolved to incorporate more and more sophisticated features. Windows-based FDT/DTM architecture diverged from text based EDDL designs. Device vendors often support both. End users began demanding a single solution as procurement, configuration and maintenance costs escalated. In 2007 the FDI project was launched to carefully shape convergence of FDT/DTM 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 FieldComm Group took over the management of FDI technology on behalf of the Foundations that own the standard. Profibus/Profinet International and FieldComm Group co-own FDI Technology.



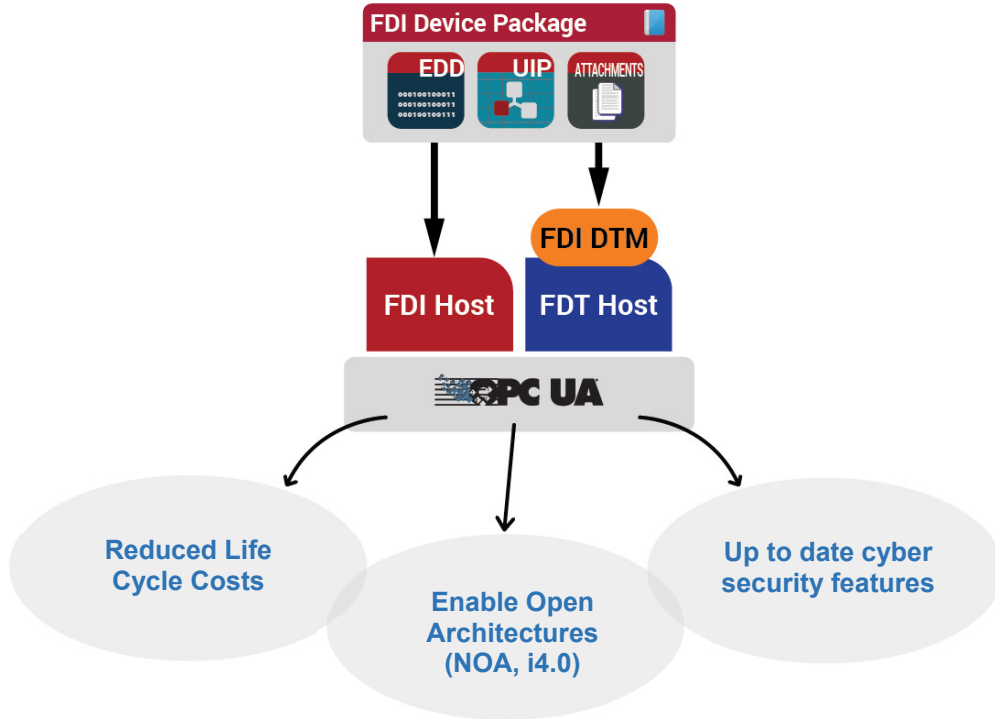
Motivation Behind FDI

FDI technology is a natural response to the following development and usage needs imposed by increasingly complex instrumentation, host systems and operational performance requirements:

1. The need to improve the security of system software for devices and hosts.
2. The need to create a platform that enables open architectures.
3. The need to simplify the development and maintenance associated with device drivers.
4. The need to reduce dependencies caused by operating systems revisions.
5. The need to provide a single source for registered, specification conforming, device software.
6. The need to evolve device software to recognize growing market for mobility and browser-based applications.

The OPC UA interface for FDI enabled systems provides standards-based access to device information.

In addition, FDI solves the problem of *securely* integrating increasingly complex field devices with the multitude of protocols, networks, control systems, and asset management systems in an operating system independent way. Furthermore, FDI combines many of the advantages of FDT with those of EDDL in a single scalable solution.



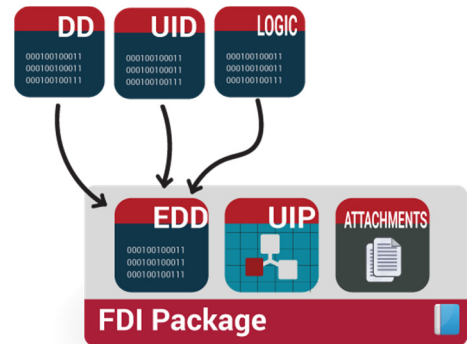
The FDI Device Package: ONE Device – ONE Package – ALL Tools

FDI standardizes the packaging and distribution of software. Host systems need only one FDI Device Package per device type per protocol to successfully integrate each device.

What is an FDI Device Package and how is it created?

A physical device is virtualized in software as an FDI Device Package. An FDI Device Package is a single file (*.fdix) which can contain all the device information including device definitions, textual and graphical user interfaces, business logic, certificates, device manuals and other components that are essential for managing the field device in the plant. Therefore, the FDI's signature slogan - **"ONE Device - ONE Package - All Tools"**.

An existing EDD file for a particular device can be used by developers to create the FDI Device Package for that device. In order to support sophisticated devices, a UIP (User Interface Plug-in) software component, with its rich Graphical User Interface, can be added to provide superior user experience. Attachments are comprised of registration certificates, manuals, wiring diagrams and communication profile specific files such as GSD and CFF.



A single instance of an FDI DTM in an FDT system can interpret any number of FDI Device Packages, thereby fully integrating all the FDI features into the FDT system.

Using FDI Technology with FDT Systems

The FDI Device Package specification was structured to provide a path to the creation and integration of operating system independent device driver and user interface software. To better understand how this is possible requires an overview of FDT technology.

FDT Technology Overview

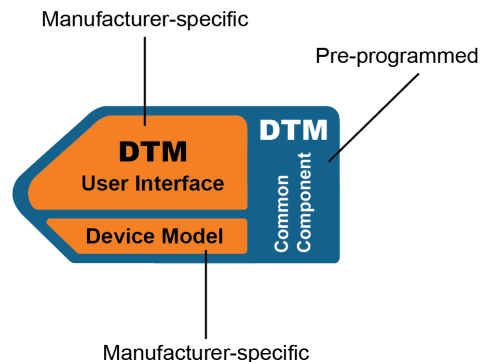
FDT technology is an open standard for integration of all factory and process automation networks and devices providing configuration, diagnostics, and prognostics for the devices and the underlying networks. The FDT standard was initially realized as a single user, desktop environment but it has since been enhanced to support server and cloud based architectures in an operating system agnostic architecture. Multi-user FDT platforms support all common web browsers allowing secured access on phones, tablets, and desktops throughout the enterprise.

FDT technology is embedded by manufacturers in various tools such as stand-alone configuration programs, PLC programming tools, and DCS asset management systems. The FDT functionality in such a system is called an FDT/FRAME™. Systems that support the newer FDT multi-user, distributed architectures are commonly called FDT Servers.

End devices, machines, network cards, and network gateways are represented in the FDT standard as an FDT/DTM. There are various types of DTMs but for the purposes of this paper, two types of device DTMs will be explored – manufacturer specific DTMs and interpreter DTMs.

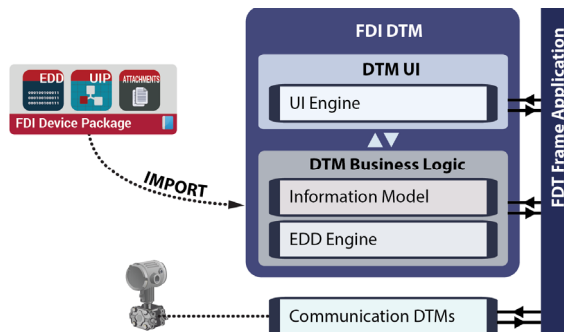
Manufacturer Specific DTM

These DTMs offer the greatest functionality and support. A single device DTM can support one or a family of a common type of devices such as pressure or temperature transmitters. These DTMs can be expanded with additional features such as extended configuration and diagnostic capabilities, networking analysis or curve display. The device DTM includes a graphical user interface, configuration parameters and business logic.



Interpreter DTM

These DTMs are not uniquely programmed for a specific device. Instead, they interpret other types of device representations, for example: Device Descriptions (DDs), Electronic Device Descriptions (EDDs), and Field Device Integration (FDI) Device Packages. A single instance of an FDI Device Package Interpreter DTM, or simply FDI DTM, in an FDT system can interpret any number of FDI Device Packages, thereby fully integrating all the FDI features into the FDT system.



Benefits of Using FDI Device Packages with FDT



FDI Benefits for Users

- A single file package for device configuration, specifically including complex devices, that includes the EDD, product documentation, device-centric user interfaces,
- Cyber security through digital certificate technologies,
- More easily understood file names,
- Better cataloguing including a Device Repository library for FDI Device Packages.
- Less OS dependency

End User Benefits

Features of the FDI Device Package enables numerous benefits when used with an FDT application:

Reduced Driver File Count. As discussed above, through the use of an FDI Device Package with an FDI DTM, users can maintain a single FDI Device Package per device to support both FDT and FDI based host systems. This translates into reduced lifecycle maintenance and administration costs.

Enhanced Security. FDI Device Packages were designed for security. As part of FieldComm Group’s registration process for device packages, each package is assigned a digital signature to ensure authenticity and integrity. UIPs run in a sandbox to ensure that 3rd party software cannot impact the FDI host system.

Online Device Package Repository. A key component of the FDI eco-system is an online repository of registered FDI Device Packages. End users can access the repository directly through the FieldComm Group website. There they can find the latest device package for their instrument. Additionally, suppliers can access the repository through a programming interface and build automatic access and synchronization into their host applications.

FDI Device Packages, the best of both worlds!

	All Files in ONE Package	Security Signing	Online Repository	Reduced file management	One package for multiple hosts
FDI Device Package with FDI or FDT Host	Yes	Yes	Yes	Yes	Yes

Manufacturer Benefits

By transitioning to FDI Device Package development, manufacturers benefit by using a single development environment to create device software for use with EDD, FDT, and FDI host systems.

Manufacturers can also take advantage of other features of the FDI Device Package including:

- User interface programs for graphical depiction of device configuration and management parameters using HTML5.
- Addition of device specific documentation, such as certificates, installation guidelines and operating manuals directly in the FDI Device Package.
- Secure signing.

Additional benefits include:



FDI Benefits for Manufacturers

- Integrated Development Environment ensures interoperability and cost-efficient development of FDI Device Packages
- Single toolset used for both product development and device registration
- Single toolset to develop many protocol variations - familiar user interface for simplicity and ease of development with FDI Common Host Components ensuring device to host interoperability
- Central Repository for FDI Device Package distribution for Users and Host Manufacturers



FDI Benefits for System Manufacturers

- A single toolset for both FDI Packages and legacy EDD systems covering multiple communication protocols including HART, HART-IP, FOUNDATION Fieldbus, ISA100, and PROFIBUS/PROFINET
- The client-server architecture simplifies the use of device data and functions in powerful, distributed control systems, with client-side installation no longer required
- Transparent access to device data and functions through the OPC UA information model facilitates the integration with other applications; the central management of data prevents inconsistencies



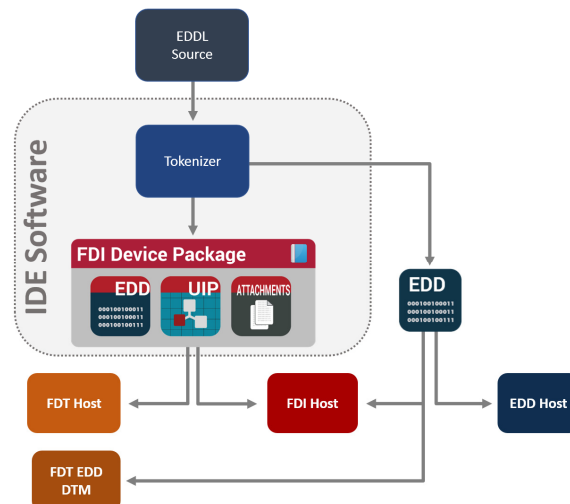
FDI Benefits for Device Manufacturers

- Reduced development effort and cost savings - FDI Device Package is created for only one device, instead of the current host specific EDD variants and DTMs
- Scalability – common technology delivering simple device packages for simple devices, and sophisticated device packages for complex devices

Suppliers save development time by developing an FDI Device Package only once - for use in both FDT and FDI host systems.

The FDI Package IDE software makes writing, running and testing of FDI Device Packages easier and more efficient by providing the complete tool chain you need for FOUNDATION Fieldbus, HART, PROFIBUS and PROFINET devices in one application.

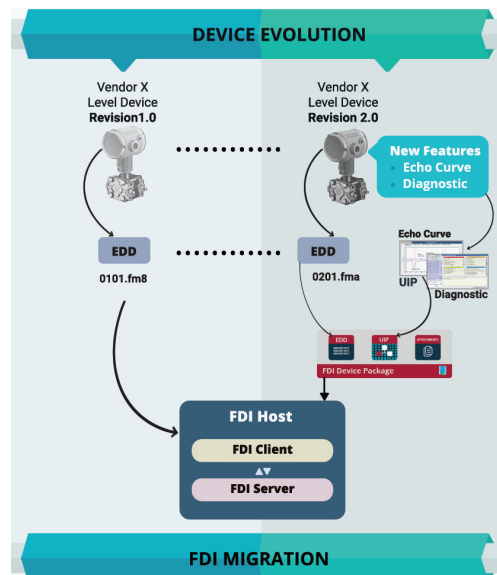
The IDE supports EDD editing and tokenizing into one encoded file format. The encoded EDD, the UIP (developed using Visual Studio) and the attachments are combined to form an FDI Package by the FDI Package IDE. The Reference Runtime Environment runs the FDI Packages for testing and debugging. The Device Package Conformance Test Tool performs automated conformance testing of FDI Packages.



Next Steps for End Users and EPCs

Here are the steps you can take today to enhance your investment in FDT with FDI:

1. Update your Enterprise/Facility Instrument Asset management programs to incorporate FDI features and capabilities – specifically requirements for:
 - Certified interoperability
 - Central trusted repository of new/updated FDI Device Packages and EDDs
 - Supply Chain cyber security for new/updated FDI Device Packages and EDDs
2. Specify FDI hosts and FDI Device Packages in new, upgrade and refurbishment projects. Purchase Request language is available at <https://www.ask4fdi.com/ask4fdi-in-purchasing-requests>
3. Use an FDI DTM that hosts FDI Device Packages in the FDT host.



Summary

- The FDI Device Package is the standard method for device integration for both FDI and FDT systems.
- Using FDI Devices Packages with FDT applications simplifies development for manufacturers and provides significant benefits for end users.

ONE Device – ONE Package – ALL Tools

Learn more about FDI technology by visiting [ASK4FDI.com](https://www.ASK4FDI.com)



FieldComm Group
9430 Research Boulevard, Suite 1-120
Austin, TX 78759
USA

Phone: +1 (512) 792-2300

fieldcommgroup.org

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FDT Group AISBL
5 Industrieweg
3001 Heverlee
Belgium

Phone +32 10 22 22 51

fdtgroup.org