From Legacy to Unified:
The Evolution of Device Integration Standards in Process Automation Industry

Contents

Acronyms & Abbreviations

HCF(HART Communication Foundation): HCF was the global standards organization responsible for developing and maintaining the HART (Highway Addressable Remote Transducer) protocol, one of the most widely used communication standards in process automation. In 2015, HCF merged with the FOUNDATION Fieldbus organization to form the FieldComm Group.

PNO (PROFIBUS Nutzerorganisation): German-based organization responsible for PROFIBUS and PROFINET standards. PNO is part of PROFIBUS & PROFINET International (PI), a worldwide network of regional associations supporting industrial communication standards across sectors like manufacturing, process automation, and infrastructure.

FieldComm Group: FieldComm Group is a global standards organization that develops and maintains key technologies for intelligent device integration and communication in process automation. Core technologies of FieldComm Group include HART, Foundation Fieldbus, FDI, FDT, EthernetAPL etc.

FDT: FDT is widely used in process and factory automation to simplify device management and enhance interoperability. FDT was earlier owned by FDT Group, recently, it has been merged with FieldComm Group.

FDI (Field Device Integration): Unified standard combining EDDL and FDT concepts for device integration. This standard is being managed by FieldComm Group

FDI Device Package: A standardized package containing device description, UI, drivers, and documentation for FDI hosts.

EDDL: Electronic Device Description Language

DCS: Distributed Control System

DTM (Device Type Manager): Software component used in FDT architecture to configure and manage field devices.

Communication DTM: A DTM that handles communication protocols (e.g., HART, PROFIBUS) between host and devices.

Executive Summary

Inoil&gas operations- whether upstream, midstream, or downstream, plants rely on thousands of field devices like pressure transmitters, flow meters, valves, and analyzers. Managing these devices across hazardous environments and complex networks demands robust integration standards. That's where FDT, FDI, and EDDL come in. Each of these standards play a unique role in simplifying device configuration, diagnostics, and lifecycle management.

Use Cases

- A refinery using FDT can monitor valve health and recalibrate instruments without sending technicians into hazardous zones.
- An offshore platform can deploy FDI packages to quickly integrate new sensors into its control system, minimizing downtime.
- A pipeline monitoring station uses EDDL to visualize sensor data and trigger alarms for pressure anomalies.
- Chemical plants and refineries have streamlined asset management programs, enabling smoother digital transformation.

This white paper provides an overview of these standards, highlighting their market adoption, associatedchallenges, and key host systemsuppliersetc.

EDDL: Electronic Device Description Language

Amongthethreestandards, EDDL wastheearliest tobe introduced.It wasinitially adopted for HART instruments in the early 1990s, enabling digital communication with field devices.

With the inception of HCF(HART Communication Foundation), EDDL technology began to be standardized and open, it was later adopted by Foundation Fieldbus and PNO (PROFIBUS Nutzerorganisation). In early 2000, FF, HCF, and PNO collaborated to enhance EDDL and added diagnostic capabilities. This version was submitted to the IEC and became part of IEC 61804-2.

EDDL became an international standard under IEC 61804-3, endorsed by major automation foundations. Currently, it supports interoperability across different communication protocols (HART, PROFIBUS, FOUNDATION Fieldbus, etc.). At present, EDDL files (EDDs) are available for over 20 million installed field instruments worldwide.

- Phoenix Contact: Fieldbus components and configuration tools
- Pepperl+Fuchs: Advanced Diagnostic Module (ADM), FieldConnex
- Metso (now Valmet): Neles Device Manager
- Flowserve: ValveSight Diagnostic Software

Note: above list may not be complete.

Limitations of EDDL

- Limited Graphical Capabilities .

  EDDL is primarily text-based and lacks the ability to support rich graphical interfaces. This makes it less intuitive for complex device visualizations compared to technologies like FDT/DTM or FDI Device Package which allow full graphical user interfaces.

- No Support for Custom Applications

  EDDL files are not executable programs—they describe device parameters and behaviors but cannot run custom logic or applications. This restricts flexibility in advanced diagnostics or interactive features.

- Complexity in Handling Advanced Functions

  While EDDL can describe basic device operations, it struggles with more advanced functions like waveform analysis, calibration wizards, or multi-step diagnostics, which are better managed by FDI Device Package or DTM-based systems.

- Limited Interoperability with Modern Systems

  As industrial systems evolve toward more integrated and digital environments, EDDL's static nature makes it harder to adapt to dynamic data exchange and cloud-based analytics.

FDT: Field Device Tool

FDT is a vendor-neutral integration framework that enables full access to device features regardless of communication protocol. It is suitable for Complex devices like valves, drives, and analyzers and Systems requiring detailed visualization and control.

Components of FDT

- DTM (Device Type Manager): Software driver that provides a rich graphical interface and full functionality.
- FDT Host Application: Platform (e.g., PACTware, FieldCare) that loads and runs DTMs, enabling interaction with field devices.

```
METHOD ZERO_CALIBRATION
{
 DISPLAY_NAME "Zero Calibration"
 HELP "This method performs zero calibration on the pressure transmitter."

 ACTION
 {
  WRITE VARIABLE "CALIBRATE_ZERO" VALUE TRUE
  WAIT 5000
  READ VARIABLE "CALIBRATION_STATUS"
  IF VARIABLE "CALIBRATION_STATUS" == "SUCCESS"
  {
   MESSAGE "Zero calibration completed successfully."
  }
  ELSE
  {

   MESSAGE "Zero calibration failed. Please retry."
  }
 }
}
```

Above code snippet shows the pseudo code in EDDL language for performing the Zero Calibration method for Pressure Transmitter. This is a simplified example. Real-world DD methods can include loops, conditions, user prompts, and graphical elements.
Instrument suppliers typically provide an EDDL (Electronic Device Description Language)/FDI Device Package file along with their devices, such as pressure transmitters, level sensors, gas detectors, actuators etc. These instruments support communication protocols like HART, PROFIBUS, ISA100 and FOUNDATION Fieldbus. These files will be integrated into EDDL Hosts.

EDDLHostsuppliers

- Emerson: AMS Device Manager, 475/475 Field Communicator.
- Siemens: SIMATIC PCS 7, PDM (Process Device Manager).
- ABB: 800xA System, Field Information Manager.
- Yokogawa: CENTUM VP, PRM (Plant Resource Manager).
- Honeywell: Experion PKS, SmartLine Device Manager
- Endress+Hauser: FieldCare, DeviceCare
- Schneider Electric: Foxboro DCS, EcoStruxure Process Expert
- Rockwell Automation: FactoryTalk AssetCentre, Studio 5000.
- VEGA: PACTware with EDD support

- Communication DTM: Special DTM that manages communication protocols (e.g., HART, PROFIBUS, FOUNDATION Fieldbus) between the host and devices.

Advantages

- Protocol-independent architecture.
- Supports advanced diagnostics, calibration, and configuration.
- Enables remote access and condition monitoring.

FDT Hostsuppliers

- Siemens SIMATIC PDM
- Yokogawa PRM
- CodeWrights Pactware
- Endress+Hauser FieldCare
- Honeywell FDM
- Emerson AMS
- Schneider Electric EcoStruxure

Note: above list may not be complete.

FDT is widely adopted in industries like oil & gas, water treatment, and manufacturing for its flexibility and depth.

FDI: Field Device Integration

FDI is a newer standard that merges the strengths of EDDL and FDT into a unified integration model. FDI Device Package includes EDDL files, optional UI plug-ins, certificates, manuals, and protocol-specific components. FDI is designed to streamline engineering workflows and reduce lifecycle costs, especially in large-scale process automation. FDI is increasingly seen as the future-forward standard, offering a scalable and unified approach to device integration.

Advantages

- Simplifies device integration with a single package.
- Ensure compatibility with host systems.
- Supports both simple and complex devices.

Specific Use Cases

- Remote Diagnostics: Enables engineers to troubleshoot devices from control rooms or remote locations, reducing field exposure.
- Advanced Configuration: Supports complex devices like control valves and analyzers with rich graphical interfaces.
- Protocol Bridging: Integrates devices across HART, FOUNDATION Fieldbus, PROFIBUS, and Modbus seamlessly.
- Safety Compliance: Helps maintain SIL-rated devices and ensures proper documentation for audits.

Conclusion

FDI (Field Device Integration) Device Package adoption is steadily growing across the industrial automation sector, driven by the need for standardized, interoperable device integration. FDI packages often include EDDL files and optional FDT-style plug-ins, allowing host systems to choose the best integration method. This flexibility is crucial in oil & gas, where legacy systems coexist with modern platforms. FDI is seen as a key enabler for Industry 4.0, allowing intelligent field devices to share rich diagnostic and operational data across enterprise systems.

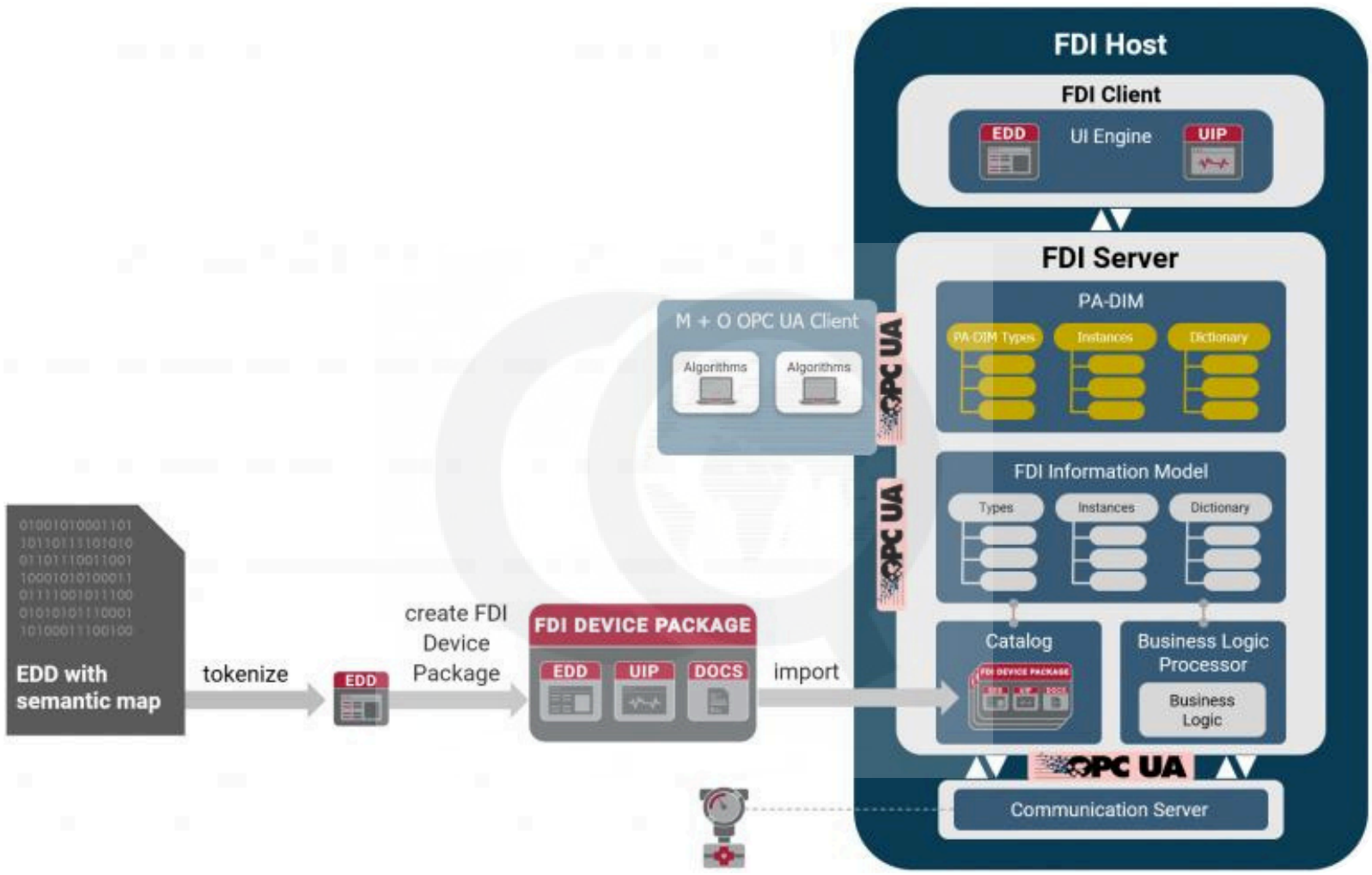
Choosing between EDD, FDT, and FDI as an instrument supplier depends on your product strategy, target markets, and the host systems your customers use.
As an instrument supplier, it is not necessary to choose just one. Many suppliers offer:

- EDD for basic compatibility
- DTM for advanced users
- FDI for modern host systems

This hybrid approach ensures broad coverage and customer satisfaction.

Technical workflow of FDI

Tokenized EDDfile will be used as the base for creating FDI Device Package which will be imported into the FDI Host (FDI Client and Server). FDI Server parses the FDI Device Package and exposes the FDI Information model. Optionally, if the FDI Device Package has the Semantic Mapping, it will be exposed as PA-DIM. FDI Client has UI engine and connects with FDI Server via OPC interface and displays the information via graphical user interface. Communication to the underlying device will be managed via native protocol driver or using FDI Communication Server.



ImageSource:FieldComm Group

FDI Host suppliers

- ABBFIM
- Emerson AMS Device Manager
- Siemens SIMATIC PDM/PCS 7
- Yokogawa PRM
- Endress+Hauser FieldCare SFE
- Honeywell Experion PKS

Note: above list may not be complete.

About FieldComm Group

FieldCommGroup is a global industry organization that develops and promotes open standards for process automation. Formed in 2015 through the merger of the HART Communication Foundation and the Fieldbus Foundation, it serves as the steward of key technologies that enable interoperability and digital transformation in industrial environments. Currently, FieldComm Group manages all the three-device integration standard (FDI, FDT and EDDL).

The organization works closely with automation suppliers, end users, and standards bodies like IECandISA to ensure global adoption and compliance.

About OjasQuest

OjasQuestisglobal product engineering service company with deep domain expertise in process automation and industrial protocols serving the customer in UK, Europe, USA and Asia. OjasQuest is specialized in Industrial standards like FDT, FDI, EDDL, OPC, HART, MODBUS, BACNet, EtherNet/IP, PROFINET, PROFIBUS etc.

Related Offering of OjasQuest

- FDT, FDI, EDDL Host Development
- FDI Device Package/EDDL/DTM Development
- AMS/SCADA application Development
- FDI Comm Server, FDI Communication DTM Development
- Industrial Software (Mobile, standalone, web) Development
- Mobile/HMI/SCADA Development
- Calibration App development

References

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FieldComm Group - Connecting the World of Industrial Automation

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