FDT®GROUP

Real-Time Data

Open the Door to Innovation

Harmonize the data wave
in control applications

DTM is the Heart and Soul of IDM

The DTM enhances the circulatory system of control applications, opening the door to modernization

Steve Biegacki – FDT Group Managing Director

How do you connect to your process and factory automation devices to configure and collect data from them without being aware of it? The answer is probably using a DTM (Device Type Manager), a software driver able to connect directly to your devices within a control system application.

The FDT Group specification, IEC 62453, is built into the core of most engineering control applications available today. The software-based solution promotes open device and system integration using DTMs for the user community. "The perfect adaptation of software and hardware platforms is the core of integration management, and it is also the core problem to be dealt with when developing your own AMS," reports Nanjing Keyuan Wisdom.

Steve Biegacki
FDT Group Managing Director

It's easy to forget that simple ideas, implemented perfectly, make for a great outcome. The DTM is often overlooked, yet it is ubiquitous in enabling control systems to manage their intelligent devices easily in multi-vendor, multi-protocol environments. "Open enables simple and simplification in a heterogeneous environment is what really matters," says Paul Brooks, Senior Manager for the Technology and Innovation Group at Rockwell Automation.

FDTDTM enables the interfaces needed to support open device and system integration. These key interfaces allow information to be presented consistently without vendor-specific models that limit interoperability and data access.

Control system users are searching for easy ways to configure and collect information from their intelligent sensors and actuators to strengthen the core connection of process and factory automation from machines and process applications. Those devices provide critical process information, enabling decision-making to improve manufacturing Overall Equipment Effectiveness (OEE).

The creation of the DTM started over 20 years ago. DTMs have evolved to support changes in operating systems and applications that have moved from device management to enabling IT systems with client access to configure the data in those devices — enabling IT/OT integration.

There are two basic types of DTMs: Communication (Comm) DTM and Device DTM.

- **Comm DTMs** represent hardware devices supporting the integration of popular networking protocols. These DTMs give users the choice and flexibility to use any protocol or a mixed networking topology instead of being locked into protocol vertical control systems.

Today, Comm DTMs support over 17 protocols, such as HART, Foundation Fieldbus, CIP, Profibus, Modbus, IO-Link, OPC UA, and many others.

- **Device DTMs** represent a physical device type. These DTMs can represent a single device, a family of devices, or a modular system and work as servers that supply device data to control systems to configure and collect defined data in sensors and actuators.

Today, there are nearly 12,000 devices supported by over 850 certified DTMs. Tens of millions of DTMs are deployed globally and serviced by FDT-hosting applications, making it a de facto standard while being an IEC, ISA, and GB-T standard.

The DTM is truly the heart and soul of the FDT Specification. Its holistic design promotes openness, independent of the system, device, and protocol, supporting a flexible and scalable architecture fit for newer technologies as they become available.

The solution works behind the scenes and is often overlooked with all the trendy topics and hype of big data, AI, ML, etc. While all these new technologies are critical to improving efficiency and sustainability, the DTM serving up all the field-level data to applications is needed to make these big ideas a reality.

The DTM enhances the circulatory system of your control application, keeping your device/process data and diagnostics flowing 24/7, allowing you to maintain (via NE 107 status alerts) and keep your application/process healthy, running in uptime!

Newer technologies will benefit from the simplification and openness DTMs provide for real-time data flow sensors to the cloud. DTM's will accelerate the modern manufacturing world to revolutionize industrial automation as we know it.

To learn how DTMs can help improve the OEE of your manufacturing processes, request DTMs from your device and control system providers during the bidding process.

We recently asked vendors to comment on FDT's device integration solution. This comment caught my eye, *"By harnessing the power of FDT/DTM technology, we enhance device integration and maintenance strategies."* – Chongqing Chuanyi Automation Co., Ltd.

VIDEO ROOM

"OPEN ENABLE SIMPLE AND SIMPLIFICATION IN A HETEROGENEOUS ENVIRONMENT IS WHAT REALLY MATTERS."

Paul Brooks, Senior Manager – Technology and Innovation Group at Rockwell Automation

"WE ARE NOT JUST ENGINEERS, WE ARE PARTNERS IN YOUR SUCCESS."

Utthunga (FDT Service Provider)

"DTMs ENABLE THE CUSTOMER ACCESS TO ADVANCED DIAGNOSTICS AND REPORTS, WHICH IS ESSENTIAL AS THE INDUSTRY PIVOTS TO IIOT / INDUSTRY 4.0 INITIATIVES."

John Groom, CEO & President at VEGA Americas

"FDT/DTM TECHNOLOGY IS A UNIVERSAL BRIDGE THAT CONNECTS ANY DEVICE MANAGEMENT SCENARIO"

M&M (FDT Service Provider)

OPEN ENABLES SIMPLE AND SIMPLIFICATION IN A HETEROGENEOUS ENVIRONMENT

FDT/DTM Opens HART
Architectures to Modernization

Solve industrial device management complexities by simplifying the process

//

Hidden complexity

Today's industrial automation architectures are built based on many complex technologies and standards to provide the best in efficient manufacturing.

The FDT/DTM technology standard (IEC 62453) is one of them, working transparently behind the scenes and focused on industrial device management.

In real applications today, end users shouldn't worry about the inner details of how the data exchange between field devices and asset management software works. Instead, they should be focused on monitoring and maintenance, optimizing production.

There is good news: behind both FDT-based host applications and DTM packages, there is a complex software communication structure, but it works like an abstraction layer, simplifying the data exchange process to a simple model based on a few basic concepts.
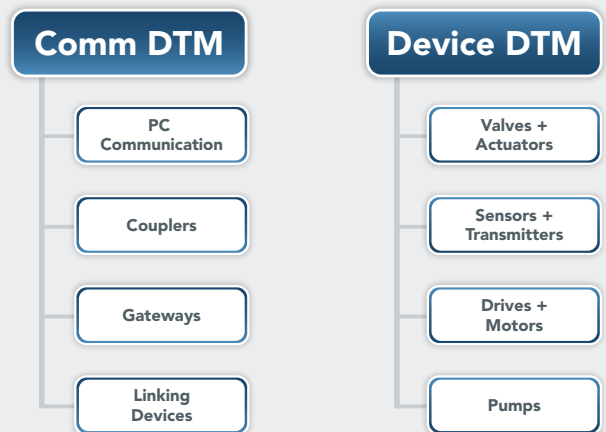
The FDT/DTM communication structure and user interface allow data access to all connected devices without the user knowing they are using the technology.

The sum is more than its parts.

An FDT-based hosting (Frame) application is necessary. FDT Frame applications host device DTMs without the need for device or protocol-specific knowledge. FDT hosting or client applications handle lifecycle management, including design – topology and IO planning, configuration, commissioning, monitoring, diagnostics, parameterization, device replacement, and asset management- all services DTMs provide.

Frame applications may be stand-alone software packages, manufacturer-specific implementations that work as stand-alone software packages, or fully integrated frameworks embedded into engineering tools (DCS, PLC, Asset Management Applications, etc.).

Detailed Architecture Elements

Comm DTM
- PC Communication
- Couplers
- Gateways
- Linking Devices

Device DTM
- Valves + Actuators
- Sensors + Transmitters
- Drives + Motors
- Pumps

Types of DTMs

Device DTMs

Device-Specific DTMs: these software drivers represent a physical device type. A DTM can represent a single device, a family of devices, or a modular system. DTMs work as servers that supply device data to client applications running in the FDT hosting application.

Interpreter DTM: these files interpret different device descriptions and make them available in an FDT Framework application. There are third-party suppliers that offer Interpreter DTMs that can manage files such as Device Descriptors (DD), Field Device Integration (FDI) Device Packages, and IODD descriptors, EDS, GSD, etc., and make them appear as device DTMs in the FDT/Framework device catalog.

Universal DTM: These DTMs can work with all devices according to a specific communications protocol.

Communication DTMs

Comm DTMs: these drivers represent hardware devices that require some application software to perform specific communication tasks and are protocol-dependent.

Gateway DTMs: these software drivers represent hardware that connects multiple communication protocols. It can be seen as combining a Communication DTM and a Device DTM.

We will use some application examples to show how these components can interact and work in real life.

We will begin with examples showing different ways to easily integrate HART field devices into control systems, thus allowing end users to gain access to the complete datasets available for these smart devices.

Single HART device with a Communication DTM

We will use PACTware Version 6.1 (FDT Desktop Solution) with the HART Communications DTM developed by CodeWrights GmbH and an Endress+Hauser (E+H) Promass 83 HART Coriolis Flow Transmitter.

The first step in a new FDT project is to select the adequate Comm DTM since this driver will enable the interaction between the field devices and the computer/configuration tool running the FDT framework.

Some popular communication protocols are supported by several Comm DTM options; some offer more functionalities, and others focus on simplicity.

Let's look at an example: CodeWrights HART Comm DTM. This Comm DTM supports using HART modems and multiplexers using either actual COM ports or emulated ones. The support of emulated COM ports is provided by the computer's OS. At the same time, serial communication can be established on emulated COM ports using USB or Bluetooth technologies.
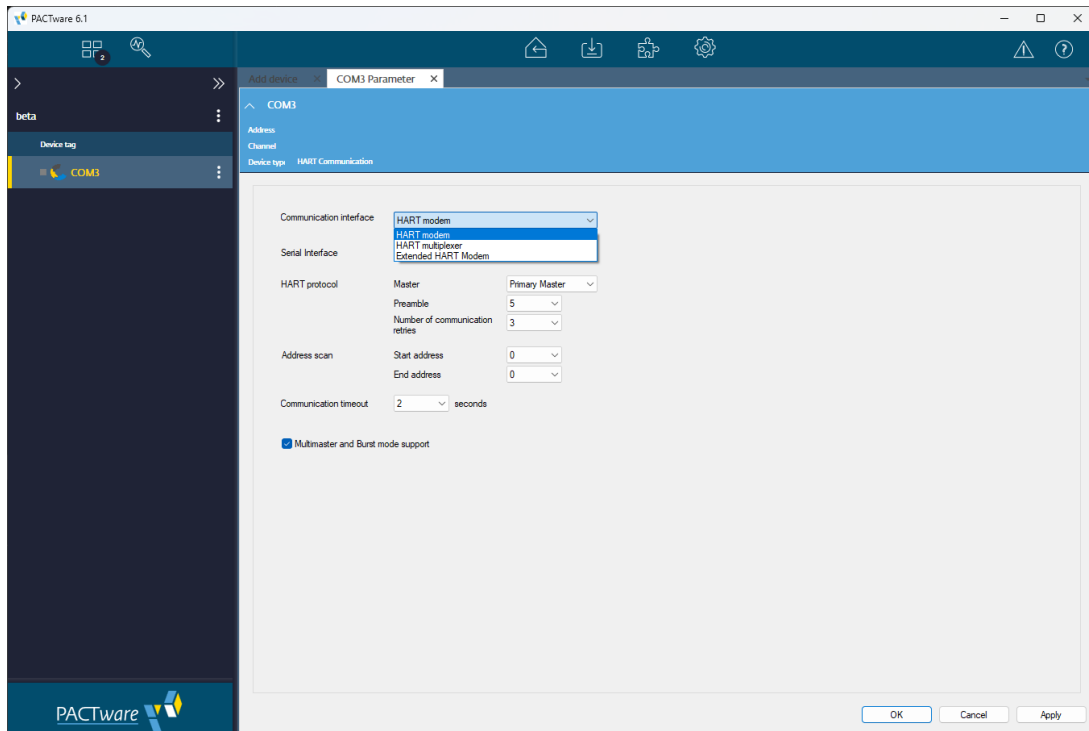
HART Comm DTM from CodeWrights GmbH

Once configured, you can either perform an automatic scan for HART-connected devices or, if you already know the device address, you can add it manually.

Then, there are two options: you can use a Universal HART DTM or a Device Specific DTM to gain access to the physical device assets.

Universal HART DTMs only allows "common practice" HART commands to exchange information with the connected HART device. This means manufacturers with device-specific profiles (functionalities and features) outside ' common practice' HART profiles will not be accessible through the Universal HART DTM. Universal DTMs can be deployed for any protocol; recognize that they can quickly bring all devices supporting that protocol online but are tied to the 'common practice' profiling by the protocol.

To gain access to the full functionality of the connected HART device, you must use the Device Specific DTM developed by the manufacturer.

Using a Universal HART DTM or a Device Specific DTM depends on your application's requirements and characteristics. Suppose you only need to get the primary process variable value and store the three remaining variables in the HART standard on an external database. In that case, a Universal DTM is sufficient.

But you need access to the entire dataset of a complex device. In that case, using the Device Specific DTM is the best option.
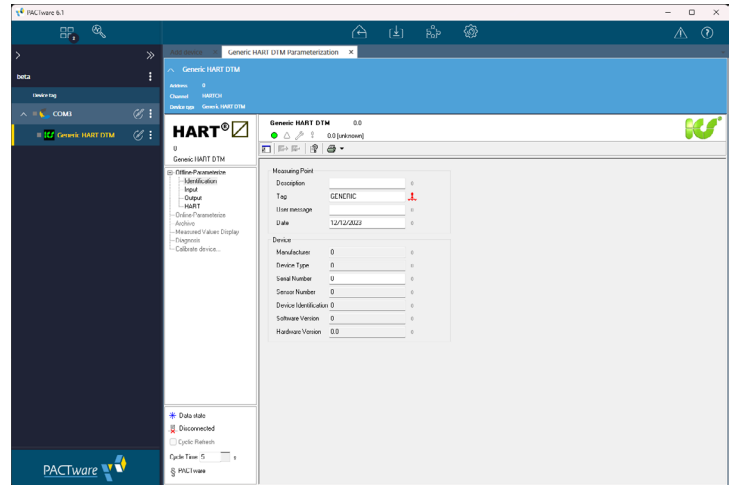
Generic HART DTM for HART devices created by ICS GmbH
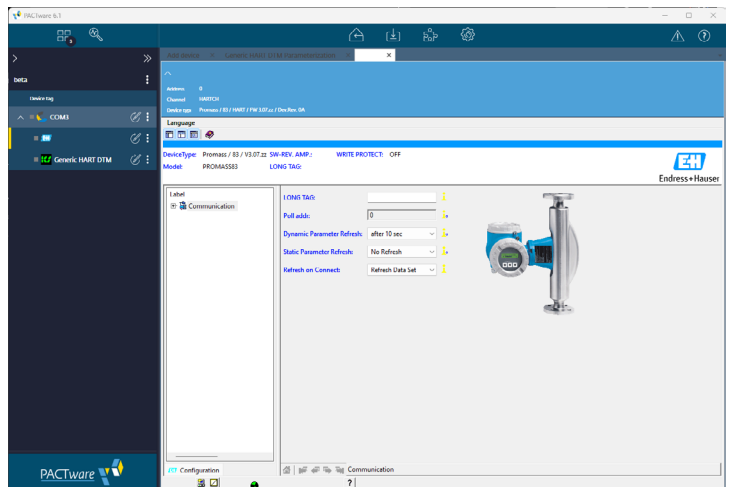
Device HART DTM for the Endress+Hauser Promass83 Coriolis HART multivariable flowmeter

## Single HART device with a Communication DTM and Gateway DTM

We will use Codewrights' HART Comm DTM set in multiplexer mode for this example. With this configuration, we can add a HART multiplexer. HART multiplexers can sequentially poll up to 64 HART devices that are connected.

Several HART Comm DTMs are available on the market, some developed by the device manufacturer and tailored specifically for use with their devices. For example, the procedure would be essentially the same using MTL's HART Comm DTM.

Gateway DTMs allow communication between the FDT Hosting Framework application and the HART devices through a single RS-485 connection to the multiplexers.

The multiplexers deployed belong to the MTL 4851/2 series. A serial server (a device that can convert RS-485 messaging to RS-232) provides an RS-485 connection that supports up to 32 MTL 4851 master multiplexers. Additionally, each one of the 4851 master multiplexers can connect to up to 16 MTL 4852 slave multiplexers. Up to 16 HART devices can be connected to each one of the 4852 slave multiplexers. Theoretically, this arrangement would allow users to manage up to 7936 HART devices with a single RS-485 connection.

Of course, in real-life applications, such a large installation would be separated into many parts to avoid single points of failure. However, the application concept is an example of the scalability that FDT technology can provide. In our example, three MTL 4851 and three MTL 4852 multiplexers are configured.
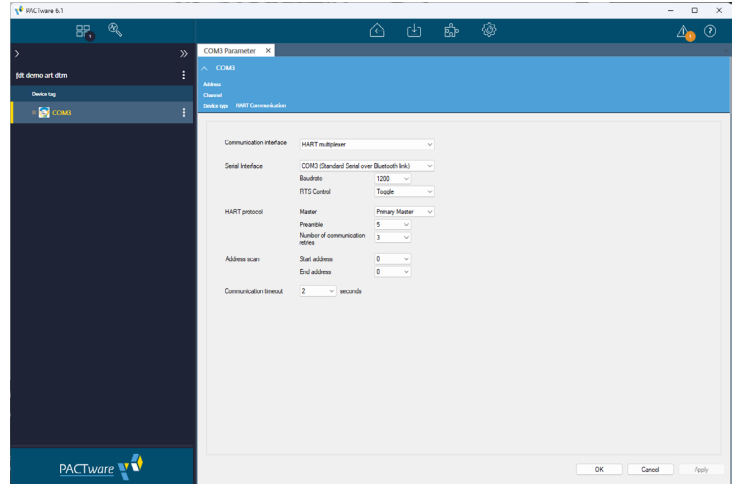
HART Comm DTM from CodeWrights GmbH in multiplexer support mode
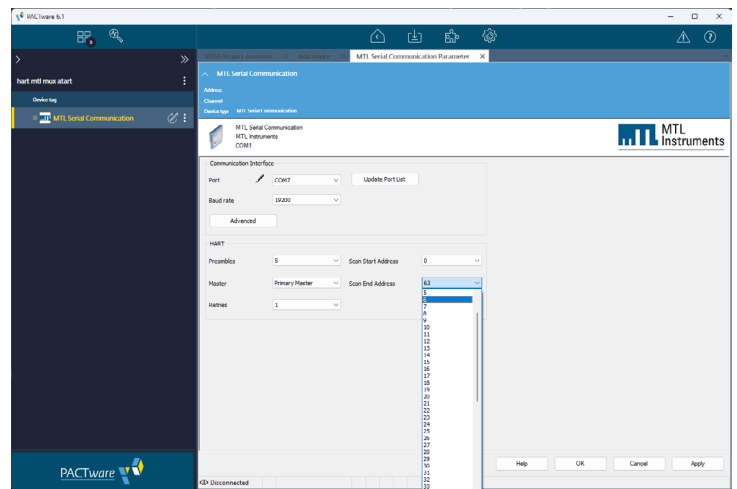
MTL's HART Comm DTM for multiplexers setup
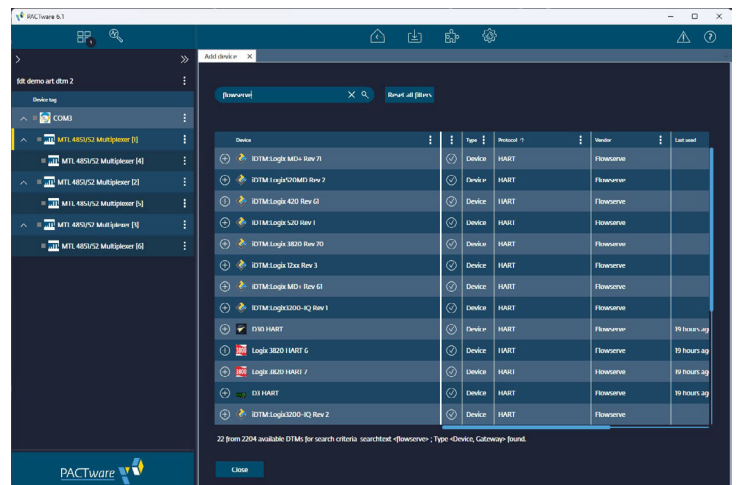
MTL's series 4851/2 HART multiplexers configuration

The next step involves connecting the Device DTMs to the HART multiplexers' Gateway DTMs. We will use Flowserve's Logix 3820 proportional valve actuators.

When we connect a Logix 3820 valve actuator to an MTL 4851 master multiplexer, we must use channel 2 since channel 1 is already connected to an MTL 4852 slave multiplexer. Actuators connected to the MTL 4852 multiplexers can be connected to all channels.

These valve actuators use Device Specific DTMs that allow users to perform extensive configuration and parameterization of the devices and enable end users to do remote diagnostic tests from the control room, such as Partial Stroke tests, which are mandatory in safety-related applications.

There is even one more advantage; you can add devices of any type, if already installed, by performing a copy-and-paste operation.
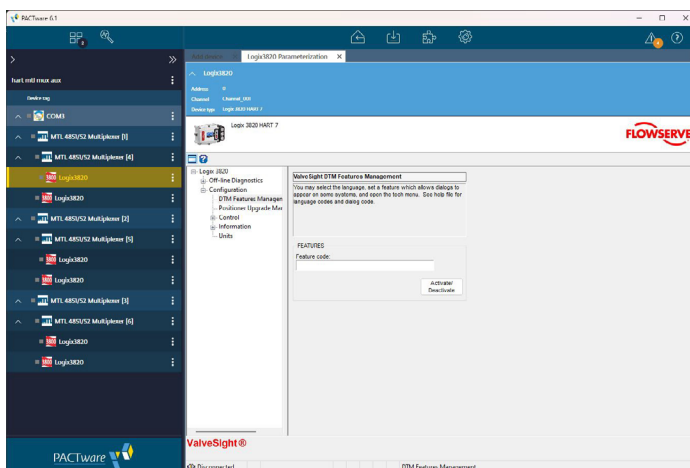
This modular expandability support makes using HART multiplexers an excellent example of the asset management capabilities that FDT technology can provide for large-scale applications, such as plant centralized valve management.
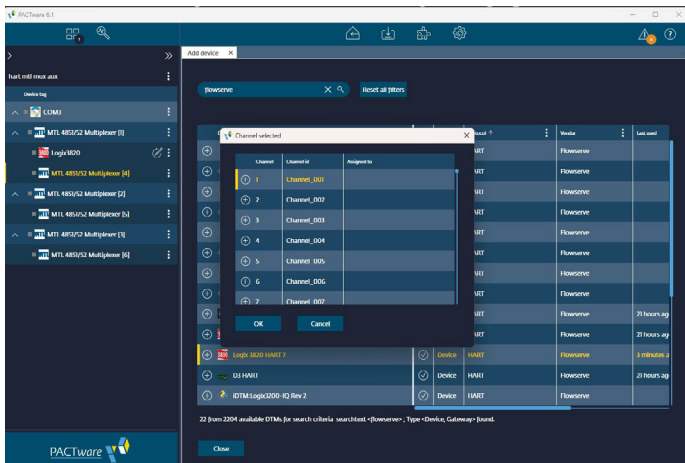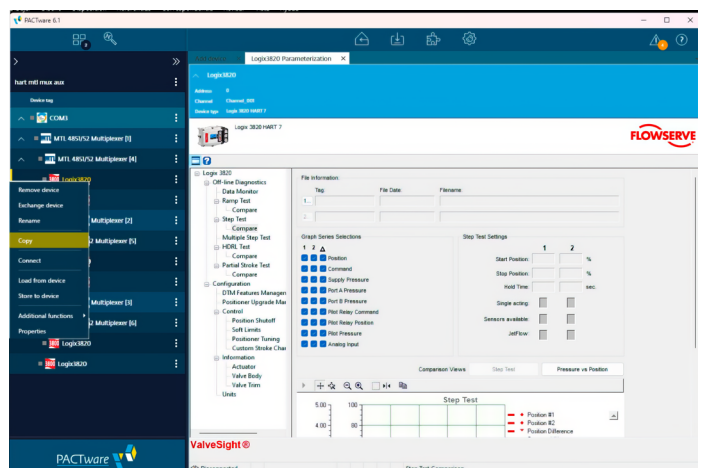

Connection of the Flowserve's Logix 3820 HART valve actuators
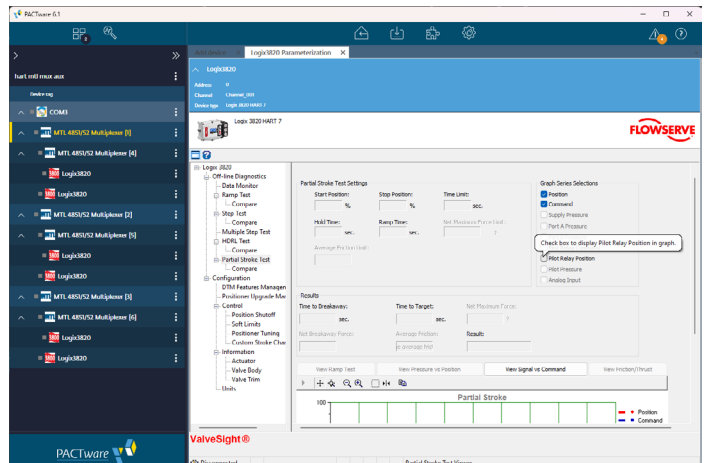
Diagnostics of the Flowserve 3820 HART valve actuators

Configuration of the Flowserve 3820 HART valve actuators

Adding additional valves using the copy-and-paste method.

Integrating HART-IP and Wireless HART with FDT Technology

Over the years, the HART protocol has evolved. Newer implementations of the technology include wireless HART and HART-IP.

The most exciting aspect of these new technologies is that, although they incorporate state-of-the-art wireless communication protocols or embed traditional HART data packages into an Ethernet-based implementation, they are fully interoperable with legacy devices.

Therefore, users have the flexibility to connect a Wireless HART Adapter to an already installed HART device and provide it with a wireless connection to a Wireless HART Gateway that will pass its data to the control system after adequately converting it to a standard Industrial Ethernet protocol like Modbus TCP, EtherNet/IP or Profinet.

For example, we will use an Endress+Hauser HART-IP Comm DTM that will convert Wireless HART data generated by Wireless HART devices into the HART IO protocol to be used by HART-IP-compliant control systems.

Other Comm DTMs could communicate the data to EtherNet/IP-, Modbus TCP- or Profinet-based control systems if that option wasn't available. A Gateway DTM, corresponding to the Wireless HART Gateway used in the application, would be responsible for creating and managing the Wireless HART mesh network composed of the HART field devices.

These Wireless HART devices can be either native or traditional HART devices equipped with a Wireless HART Adaptor. All these options are made possible using Device Specific DTMs.
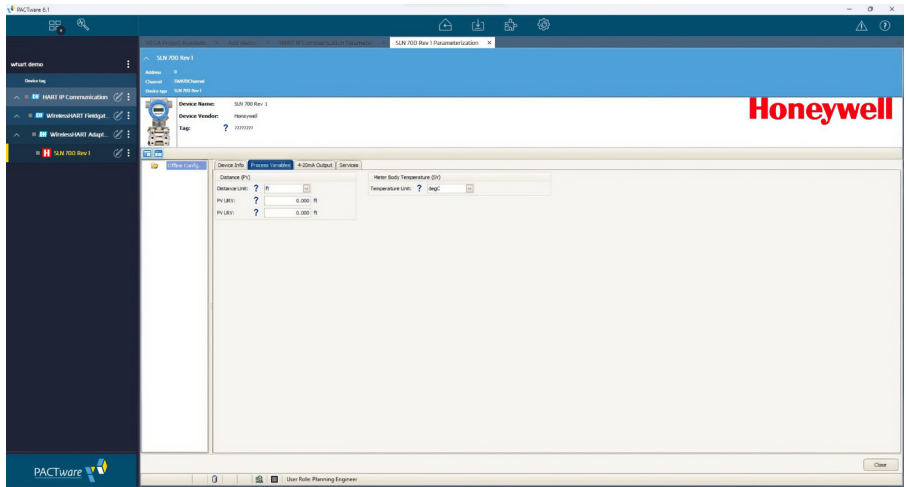
A Honeywell HART SLN 700 differential pressure transmitter connected to a E+H SWA70 Wireless HART Adaptor
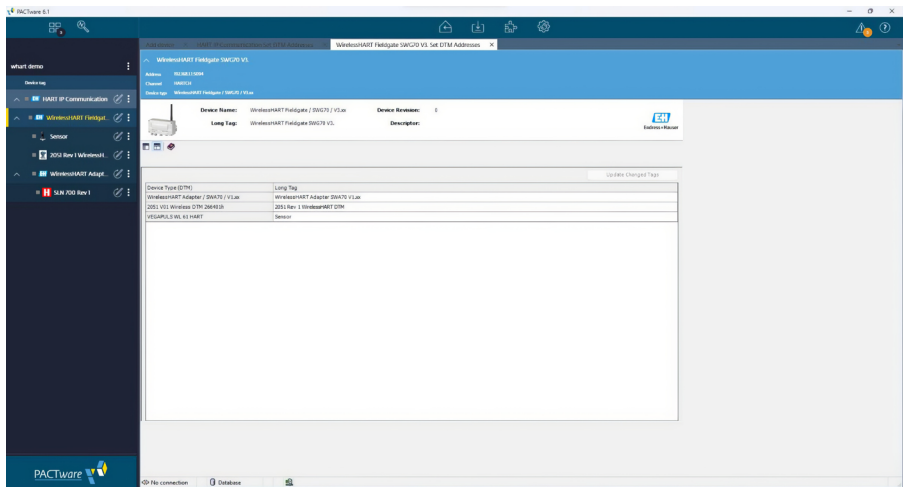
Management of Wireless HART devices (native and adapted) from the Wireless HART Gateway
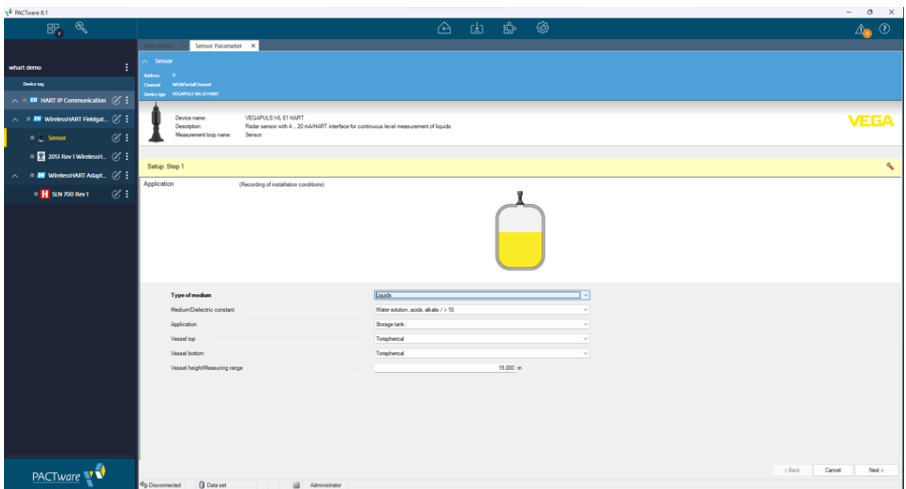
Native Wireless HART transmitters from Vega and Rosemount connected to a E+H Wireless HART Gateway

Conclusions

In all the above examples, we were able to see how FDT technology helps solve industrial device management complexities by simplifying the process. Complexity is not the answer!

Tasks that used to require the use of large and very expensive handheld configurators can now be done with a cheaper PC running an FDT/DTM hosting framework application and with a more straightforward user interface.

It has always been challenging to use and take advantage of the complete set of features of smart devices. But with FDTDTM, complex operations like data memory mapping and protocol translation are done in an invisible way to the end user.

Smart devices will continue to evolve with new features and functions that generate larger datasets. All of which will continue to benefit even more from this ubiquitous and flexible technology.

//

You may also read this article online here.

Eco**struxure**™
Field Device Expert
for HART
Version: 5.0

Life Is On | Schneider Electric

Full Stack FDT UE Support

M&M

FDT UE
fdtSERVER

Cross-Platform with legacy DTMs: A Bridge from Legacy to the Future

www.mm-software.com/en
fdt@mm-software.com

Interview with Pingsheng Xu, Development Group Manager

Steve Biegacki, FDT Managing Director, sat down with Pingsheng Xu, Development Group Manager – M&M Software China, to discuss device integration strategies with FDTDTM technology and their offerings supporting the industrial automation community as a leading FDT Service Provider.

SB Steve Biegacki
FDT Group Managing Director

PX Pingsheng Xu
Development Group Manager – M&M Software China

SB

Pingsheng, thanks for joining me to discuss device integration strategies using FDTDTM. Can you please introduce M&M Software to the automation community?

PX

M&M Software is a leading FDT Service Provider with a comprehensive portfolio of products and services. We combine our 20 years of expertise in FDT with continuous innovation to meet the new challenges in the industry. We also provide professional software development services for the entire life cycle of your projects.

SB

I believe M&M Software was our first FDT Service Provider! We appreciate your long-term commitment to service the industry with FDT solutions for device management.

How does FDT technology help solve the critical need for device integration?

PX

FDT technology is a universal bridge that connects any device management scenario to any device under any fieldbus/protocol from any vendor. FDT protects the factory investment by harmonizing different elements in a unified environment. For example, you can use FDT to integrate APL devices with legacy HART devices or 20-year-old device drivers with new cross-platform systems.

SB

Great example! It's fantastic to see the progress, adoption, and evolution of FDT over the last 20+ years. We have 850 certified DTMs supporting over 12,000 devices now.

What are the main FDT development tools and services that you offer?

PX

M&M Software is a full-stack vendor for the FDT ecosystem. We can help you build DTMs, FDT Desktop (Frames), and FDT UE Servers. We have a rich set of tool choices for your needs, from ready-to-use OEM products to complex SDKs with maximum flexibility. Of course, we are also happy to do the complete development for customers.

SB

M&M truly offers the whole gamut of FDT solutions and services, allowing vendor options when developing FDT solutions!

The industrial market is in the fast lane to operate more efficiently with reliable solutions supporting modern IIoT technologies. How is M&M Software helping the vendor community meet innovative manufacturing initiatives and preserve the legacy install base?

PX

M&M Software is always proactive in solving market challenges with our 20 years of experience in FDT. For example, we have developed an innovative product called M&M fdtSERVER, which bridges the gap between the legacy install base and the modern distributed cross-platform solutions.

This new solution can help system vendors bridge the IDM gap using legacy DTMs while supporting users on their journey to modern IDM solutions with cross-platform access as new web-based FDT3 DTMs emerge.

SB

What are the current challenges in the FDT ecosystem, and how does M&M Software address them?

PX

We see two significant challenges in the FDT ecosystem: the high cost of DTM development and the scarcity of FDT3 DTMs in the early stage of FDT3. The good news is that we have a solution that can address both challenges: we offer Universal (Generic) DTMs that support all devices of a fieldbus and Interpreter DTMs that can manage any device with a DD file or FDI package, even proprietary device descriptions. Please stay tuned for our new products and solutions.

SB

Thanks for your time today, Pingsheng. We all look forward to your new solution announcements addressing these challenges, allowing easier adoption of FDTDTM supporting industrial device management optimization for the automation community.

For more information, please reach out to: fdt@mm-software.com

Schneider Electric

Maximizing Efficiency and Reliability: Schneider Electric's Innovative Field Device Management Solution
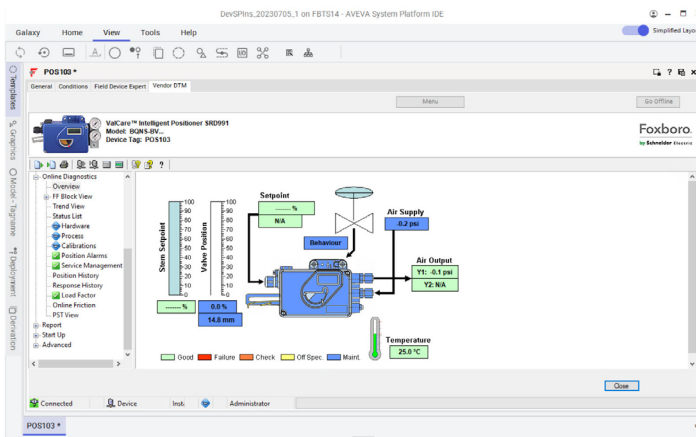
AUTHORS:
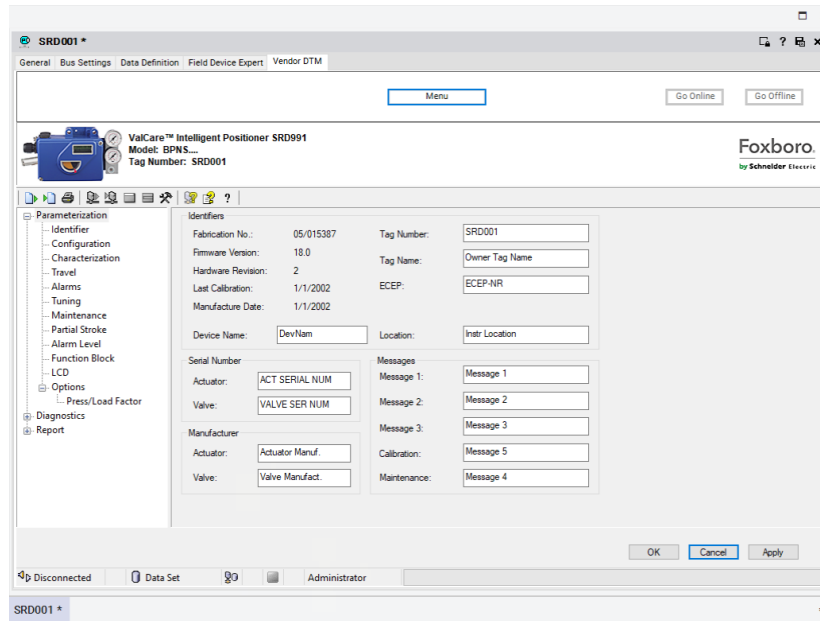Manoj CHANDRASEKHARAN
and Rogier van Dijk

OFFERING A COMPREHENSIVE, END-TO-END APPROACH TO OPTIMIZE EFFICIENCY, RELIABILITY, AND COST-EFFECTIVENESS IN INDUSTRIAL PROCESSES

Traditional field device management solutions have primarily focused on configuration and diagnostics. However, to achieve optimal performance and cost-effective maintenance of field devices, it is essential to adopt a more holistic approach. Recognizing this need, Schneider Electric introduces an innovative Field Device Management offering.

At the heart of this groundbreaking solution lie two powerful modules:

1. **EcoStruxure Field Device Expert:** This integrated solution, built on FDT technology, empowers businesses to efficiently commission, configure, and maintain field devices throughout their lifecycle. The Intelligent Commissioning Wizard automates HART field instrumentation commissioning, reducing manual efforts and maximizing efficiency.

2. **EcoStruxure Maintenance Advisor:** Leveraging advanced analytics and IoT technology, this module predicts potential field device failures, enabling proactive maintenance scheduling. It enhances operational reliability by providing real-time data for quick issue identification and troubleshooting. Integration with Mobile Operator Rounds ensures comprehensive asset monitoring.

By combining these solutions, Schneider Electric offers a comprehensive, end-to-end approach to optimize efficiency, reliability, and cost-effectiveness in industrial processes:

1. **Increased Efficiency:** Automating commissioning and providing predictive maintenance insights reduces downtime and improves operational efficiency. Proactive maintenance scheduling ensures precise and timely task execution, optimizing plant performance.

2. **Enhanced Reliability:** Condition Based maintenance extends reduces the risk of unplanned downtime. Early detection and resolution of potential issues safeguard critical assets, enhancing reliability and productivity.

3. **Reduced Costs:** Implementing condition-based practices and avoiding unnecessary trips optimize resource utilization, resulting in cost savings.

4. **Improved Compliance:** Comprehensive asset monitoring improves safety and environmental compliance. Real-time monitoring and early issue detection ensure devices operate within specified parameters, enhancing regulatory compliance.

Leveraging advanced technologies and intelligent analytics, you can optimize your industrial processes, maximize asset performance, and gain a competitive edge with Schneider Electric's innovative field device management solution.

Click here to learn more about field device management solutions.

VEGA

Interview with John Groom, CEO and President of VEGA Americas

Steve Biegacki, FDT Group Managing Director, recently sat down with John Groom, CEO and President at VEGA Americas, to discuss what FDT/DTM means to VEGA, sensors, and the industry.

With over 20 years at VEGA, John has seen technology, software, and support tools come and go. However, one solution that has been key to VEGA's success is the FDT/DTM. For this reason, VEGA is a long-time advocate and supporter of DTM development.

SB Steve Biegacki
FDT Group Managing Director

JG John Groom
CEO and President at VEGA Americas

SB

Thanks for joining me today, John, to talk about FDT/DTM technology and the value it brings to VEGA and your customers.

What does being a part of the FDT community for VEGA mean?

JG

Being part of the FDT community allows VEGA to develop DTMs with enhanced features supporting best-in-breed sensors for commissioning, support, and diagnostics. DTMs enable the customer access to advanced diagnostics and reports, which is essential as the industry pivots to IIoT / Industry 4.0 initiatives.

The DTM provides the conduit to meet the digital requirements requested by the customer. This is because FDT/DTM technology is open-source and free software, allowing customers to get the most out of their sensors and processes.

SB

Why is FDT a necessary technology standard for the industry?

JG

FDT Group designed its technological standard to be an open communication platform. This is important because, in the past, manufacturers used proprietary software with control systems to try to lock out other sensor manufacturers.

FDT Group has leveled the playing field for all sensor manufacturers by introducing the DTM to the market. Most manufacturers today offer DTMs for their intelligent sensors, and most customers have bought into the DTM experience. The benefits and cost savings are real! By using DTMs, the amount of software required to commission all brands of sensors is reduced. This is important because now the customer can buy the best technology for an application and not be locked to a single vendor or purchase additional commissioning software.

SB

How important is the DTM for the customer when using VEGA sensors?

JG

The DTM allows the customer to achieve the maximum potential available in a sensor. Using a Device Specific DTM for a sensor, you can gather all values, diagnostics, and measurement data. For example, with our VEGA pressure transmitters, you can use the DTM to set up and store the sensor's critical measurement data such as pressure, cell temperature, minimum and maximum pressures, plus monitor, all sensor diagnostics, and software changes made to the sensor since commissioned. DTMs allow users to gather and analyze data points for a specific process application. Our customers can use this data to optimize their processes for improved efficiency.

SB

How does VEGA inform its customers about FDT/DTM technology?

JG

VEGA is very customer service-oriented and works around the clock to communicate FDT/DTM software updates and new offerings. We strive to reach our customers via their communication preferences - webinars, emails, LinkedIn, Facebook, websites, etc. VEGA also offers global DTM and sensor commissioning training at offices and customer locations.

Additionally, the FDT framework (PACTware) and the entire VEGA DTM Collection are available for download at no cost via the **VEGA website**.

The investment and business benefits of using FDT/DTM are huge for VEGA and our customers. Making our FDT/DTM solutions freely available to customers makes the solution simple and easy to use.

SB

What are the benefits VEGA and customers achieve when using FDT/DTM technology?

JG

One of VEGA's core values is simplicity. The DTM makes sensor commissioning and support simple for the user.

Looking ahead, as we plan to integrate IIoT and I40 sensor-related solutions, the focus is on predictive maintenance! Is the sensor performing at its optimum level? Are there software updates or changes that could help the sensor serve better? Has anyone accessed the software setup or made changes from the original setup?

Data collection, diagnostics, and event memory are all available in the sensor and can be accessed using a DTM. Identifying a sensor when it is failing or not performing correctly and fixing it before losing product or shutting a process down is the key to using DTMs. We need to keep it simple and easy for our customers. This is what a DTM does!

In summary, it is vital for VEGA to design DTMs and to inform our customers about the benefits of using FDT/DTMs. Technology is moving fast in a world where digital transformation is necessary. Sensor self-diagnostics and process data analysis must be easy to access, reducing the workload for users. FDT/DTM keeps up with the fast-changing world, providing a clear path with open-source software that is easy to invest in while supporting all intelligent sensors.

SB

John, it was great talking with you today. Thanks for sharing how FDT/DTM technology delivers business value for VEGA and your customers focused on optimizing sensor-level measurement solutions. VEGA is a leader in this sector, and it is fantastic to hear VEGA's viewpoint of FDT technology as a critical open communication platform enabling solutions today, and for sensors supporting IIoT and I40 initiatives ahead.
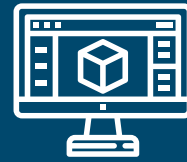
NEW FDT HOST APPLICATIONS AND CERTIFIED DTMs

NEW DTMs

**Jogler – 8000 Series
Magnetostrictive Transmitter**
(HART – Device DTM)

**Power Gen-ex – ASD
Positioner DTM**
(HART/Wireless HART – Device DTM)

KROHNE – MFC400 ER2
(HART – CommDTM)

NEW FDT3 HOST APPLICATION

Omron – CX-ConfiguratorFDT
(FDT 3.0 Desktop)

FDT®GROUP

FDT Group AISBL · 5 Industrieweg · 3001 Heverlee · Belgium

Phone: +32 (0)10 22 22 51

Email: inquiry@fdtgroup.org

fdtgroup.org