

System 800xA Device Management

PROFIBUS and HART

Configuration

System Version 6.0

Power and productivity
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About This User Manual

General



Any security measures described in this User Manual, for example, for user access, password security, network security, firewalls, virus protection, etc., represent possible steps that a user of an 800xA System may want to consider based on a risk assessment for a particular application and installation. This risk assessment, as well as the proper implementation, configuration, installation, operation, administration, and maintenance of all relevant security related equipment, software, and procedures, are the responsibility of the user of the 800xA System.

This user manual describes in detail how to use the Device Management PROFIBUS and HART. .

The information in this manual is intended specifically for planning engineers, commissioning engineers, and maintenance personnel. The user should be familiar with the basic method of operation of the PROFIBUS and HART protocol.

User Manual Conventions

Microsoft Windows conventions are normally used for the standard presentation of material when entering text, key sequences, prompts, messages, menu items, screen elements, etc.

Feature Pack

The Feature Pack content (including text, tables, and figures) included in this User Manual is distinguished from the existing content using the following two separators:

Feature Pack Functionality

<Feature Pack Content>

Feature Pack functionality included in an existing table is indicated using a table footnote (*):

*Feature Pack Functionality

Unless noted, all other information in this User Manual applies to 800xA Systems with or without a Feature Pack installed.

Warning, Caution, Information, and Tip Icons

This User Manual includes Warning, Caution, and Information where appropriate to point out safety related or other important information. It also includes Tip to point out useful hints to the reader. The corresponding symbols should be interpreted as follows:



Electrical warning icon indicates the presence of a hazard that could result in *electrical shock*.



Warning icon indicates the presence of a hazard that could result in *personal injury*.



Caution icon indicates important information or warning related to the concept discussed in the text. It might indicate the presence of a hazard that could result in *corruption of software or damage to equipment/property*.



Information icon alerts the reader to pertinent facts and conditions.



Tip icon indicates advice on, for example, how to design your project or how to use a certain function

Although Warning hazards are related to personal injury, and Caution hazards are associated with equipment or property damage, it should be understood that operation of damaged equipment could, under certain operational conditions, result in degraded process performance leading to personal injury or death. Therefore, fully comply with all Warning and Caution notices.

Terminology

A complete and comprehensive list of Terms is included in the *System 800xA, Engineering Concepts instruction (3BDS100972*)*. The listing includes terms and definitions that apply to the 800xA System where the usage is different from commonly accepted industry standard definitions and definitions given in standard dictionaries such as Webster's Dictionary of Computer Terms. Terms that uniquely apply to this User Manual are listed in the following table.

Term/Acronym	Description
CMMS	Computerized Maintenance Management System
Device Type Manager (DTM)	Software component (device driver) for configuring, diagnosing, forcing, and displaying the measured variables, etc. of a field device. It is familiar with the way the device works and supplies device specific documentation.
Device Description Language (DDL)	Interpretable language for the formal description of device parameters.
Frame Application (FA)	Frame application (runtime environment) in accordance with the FDT specification for operating DTMs.
Field Device Tool (FDT)	The FDT concept describes the interface between a Frame Application and the device specific software DTM of the device manufacturer. It enables devices produced by different manufacturers and different fieldbuses to be integrated in a single system. Supports PROFIBUS and HART fieldbus protocols.
GUI	Graphical User Interface.

Released User Manuals and Release Notes

A complete list of all User Manuals and Release Notes applicable to System 800xA is provided in *System 800xA Released User Manuals (3BUA000263*)*.

System 800xA Released User Manuals (3BUA000263)* is updated each time a document is updated or a new document is released. It is in pdf format and is provided in the following ways:

- Included on the documentation media provided with the system and published to ABB SolutionsBank when released as part of a major or minor release, Service Pack, Feature Pack, or System Revision.
- Published to ABB SolutionsBank when a User Manual or Release Note is updated in between any of the release cycles listed in the first bullet.



A product bulletin is published each time *System 800xA Released User Manuals (3BUA000263*)* is updated and published to ABB SolutionsBank.

Section 1 Introduction

Device Management software products are available for PROFIBUS, HART, and FOUNDATION fieldbus protocols. Device Management PROFIBUS and HART is designed to be used for PROFIBUS DP, PROFIBUS PA and HART protocols.

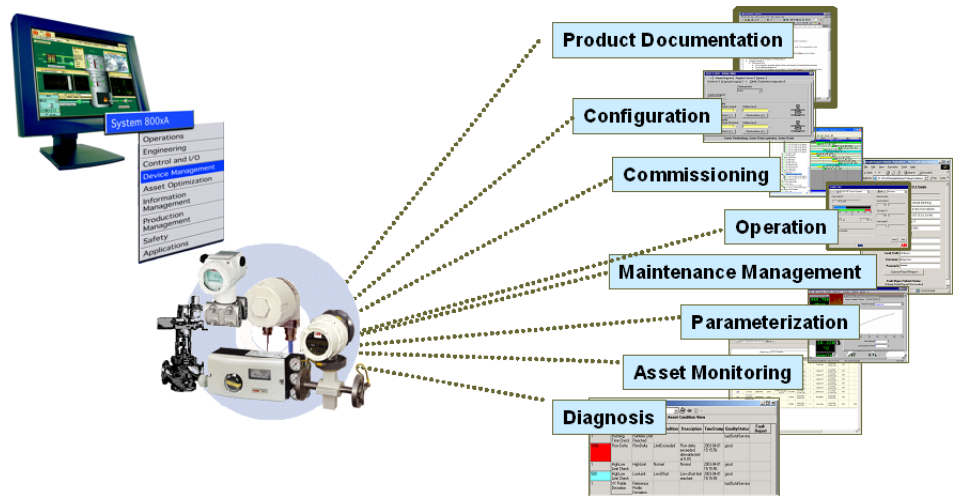


Figure 1. Components of the Device Management PROFIBUS and HART

Device Management PROFIBUS and HART allows to access internal data and information of a field device. This access can be used for configuration and diagnosis using DTMs, Asset Monitoring, and calibration. To provide for efficient engineering, along with these functionalities, the field device objects must offer CMMS interfaces and access to the manuals.

Overview of HART

The HART fieldbus communication protocol is widely accepted in the industry as a standard for digitally enhanced 4 mA - 20 mA communications with smart field instruments. Currently, a wide range of products are available in the market. HART preserves the 4 mA - 20 mA signal and enables two-way digital communication without disturbing the integrity of the 4 mA - 20 mA signal. The HART protocol is field proven, simple to implement, use, and maintain. HART field devices are connected to System 800xA through S800 and S900 remote I/O modules, AC 800M local I/O modules, HART Multiplexer and WirelessHART network (Modbus connectivity only).

Overview of PROFIBUS

PROFIBUS is an international standardized communication protocol for the manufacturing and process industries.

The two fieldbus types of PROFIBUS that are supported for the 800xA system are outlined below:

1. PROFIBUS DP - PROFIBUS DP is a high speed bus with scalable transmission rates up to 12 Mbit/s optimized for interaction with field devices such as remote I/Os, drives, and motor controller.
2. PROFIBUS PA - PROFIBUS PA is a serial 2-way communication bus with transmission rates of 31.25 Kbit/s and 25 Kbit/s designed to connect bus-powered 2-wire field devices such as transmitters and actuators. It can also be applied to intrinsically safe applications.

Overview of Device Management PROFIBUS and HART

The Device Management PROFIBUS and HART consists of a set of software components for efficient planning, commissioning, and maintaining of field devices within ABB System 800xA.

The main components are:

- Fieldbus Builder PROFIBUS/HART.
- OPC Server PROFIBUS/HART.

- Basic PROFIBUS DTM.
- Basic HART DTM.
- Device Library Wizard (installed separately from System 800xA Media).
- PROFIBUS Device Integration Library (base structure without device types).
- HART Device Integration Library (base structure without device types).
- PROFIBUS Device Libraries available in System 800xA Media (Installed using Device Library Wizard).
- HART Device Libraries available in System 800xA Media (Installed using Device Library Wizard).
- HART Multiplexer Connect (optional; to be ordered from price list).
- WirelessHART connectivity with Modbus (Managed Release).

General Limitations



Device types created by ABB are tested with the associated field devices and released for use in the 800xA system. Device types are based on the data provided by individual device vendors. For example, DDs, device specific DTMs, and Asset Monitor behavior specifications. ABB relies on this data that reflects the actual device specification and behavior. It means, ABB can neither take liability for the events that are caused by devices not functioning as per the fieldbus standards, or device specifications, nor for events caused by mismatches between the device behavior and the input data provided by the device vendor. Device Library Wizard is used to install and update the device types in the 800xA system. ABB recommends to use these device types for Fieldbus engineering.

Do not install the DTM software manually, if not described in the device type. Only tested and approved DTMs are installed using Device Library Wizard and the respective device type files.

If applicable, the licenses for device specific DTMs needs be purchased from the relevant device manufacturer. They are not part of the Device Management PROFIBUS and HART licensing mechanism.



Only one OPC Server PROFIBUS/HART is allowed to run on a single Connectivity Server. So, each control network or HART Multiplexer network containing the aspect for OPC Server PROFIBUS/HART connectivity needs its own Connectivity Server.

Asset Monitors, CMMS Connectivity and Device Management System (DMS) are the functionalities available at the device type objects. If 800xA Asset Optimization software and the related CMMS and DMS software is installed and licensed in the system, only then they run with Device Management PROFIBUS and HART.

Do not modify PROFIBUS and HART device types and its aspects unless described in detail. Inform ABB Service before modifying the aspects described in this document.

ABB cannot guarantee an operable 800xA system if device types are created/modified manually. Only tested software (DTMs) may be installed on the system computer. All software supplied in the Device Management meets this requirement.



Device Management PROFIBUS and HART do not support National Language Support (NLS) for specific aspects used by engineers and operators. It supports only English (US).



While working with large number of Device Type Objects which contain DTMs with Import/Export tool consider segmentation of AFW files. For details, refer to *Segmentation of AFW-Files in System 800xA Engineering Function Designer (3BDS011224*)*.

Do not use 800xA Aspect Server node, Application Server node, and Connectivity Server node for importing projects. Use 800xA Client node with large cache size.



It is possible to access the DTMs through Remote Desktop in Console mode only. DTM GUI may not be visible when remotely accessed through non-console mode.



It is possible to do PROFIBUS/HART OPC Server Configuration through Remote Desktop in Console mode only. OPC Configuration may not work when system is remotely accessed through non-console mode.



Device Management functionality for PROFIBUS and HART stops working if 800xA Service account user name or password or both are changed after the installation of Device Management PROFIBUS and HART software.

During the installation of Device Management PROFIBUS and HART the Windows operating system DCOM configuration is done automatically using the current 800xA service account user name and password.

If service account user name or password or both are changed through configuration wizard, then the DCOM settings are no longer valid. In such cases DCOM configuration has to be configured again. To do this, run the FBConfigureComponents.exe located at the below mentioned path using 800xA installation user account:

“Installation Drive:\Program Files\ABB Industrial IT\Engineer IT\Fieldbus Builder\bin”

Components and Functions

Fieldbus Builder PROFIBUS/HART with OPC Server

Fieldbus Builder PROFIBUS/HART

The Fieldbus Builder PROFIBUS/HART is the core component within the Device Management software package. It forms the FDT compliant interface between Plant Explorer as a part of the 800xA core system and the field devices represented by their DTMs.

The following are the main tasks:

- Topology planning and managing the fieldbus structure down to the PROFIBUS and HART devices.
- Managing (add, move, remove, or copy) PROFIBUS devices connected to the AC 800M / CI854 and HART devices connected to local I/O, remote I/O or Multiplexer.
- Assigning the HART devices to I/O channels.
- DTM call up from System 800xA nodes.
- Configuring the communication paths for online communication between the DTM and the physical field device in the system.
- Comparing field device online and offline data.
- Uploading/downloading the current DTM instance data and device commissioning.
- Exporting/importing device instance data records.
- Historical data set storage to document the life cycle of the device instance.



For more information, refer to [Section 2, Fieldbus Builder PROFIBUS/HART](#).

OPC Server PROFIBUS/HART

Current smart field devices are able to supply multiple information through their DTM. The OPC Server PROFIBUS/HART enables access to field device data without requiring additional field wiring. So, the business level applications such as 800xA Asset Optimization can access the connected field device data. The OPC Server PROFIBUS/HART is designed to provide specific field device data, device status, and diagnostic data to Asset Optimization Server.



Due to the nature of the HART protocol and the necessary routing through the system, HART device data may not be updated immediately after starting read/write access.



Refer to [Section 3, OPC Server PROFIBUS/HART](#) for detailed information.

Device Library Wizard, Device Types and Device Type Objects

Device Library Wizard

For integration of fieldbus devices from ABB and third party vendors into the System 800xA environment, ABB provides device types. The Device Library Wizard is a tool, used to install and update separately delivered device types into an 800xA system.



Refer to [Section 4, Device Library Wizard](#) for detailed information.

Device Types and Device Type Objects

ABB provides tested and certified ABB and third party device types, which are represented as device type objects in the *800xA Plant Explores Object Type Structure*.

The system user not only benefits from the reduced engineering and commissioning time but also from reduced maintenance costs. The results in more effective use of fieldbus technology.

Specific device types for PROFIBUS and HART are available from System 800xA Media or from ABB SolutionsBank.

Device type objects installed through Device Library Wizard to the 800xA system are enhanced with the essential aspects for the following:

Device Management

Device Management software enables efficient planning, commissioning, and maintaining of field devices within ABB 800xA system.

Product Documentation

Product documentation is directly available at the device type object. Key product data are bundled in convenient electronic format. Thereby documents like data sheet, installation, configuration, and operation manual as well as maintenance and service manual are accessible with a right-click.

Asset Monitoring

The Asset Monitor, the Asset Reporter, and the Asset Viewer acquire and analyze asset status and condition information. If an abnormal condition occurs, that calls for maintenance action, then the Asset Monitor, the Asset Reporter, and the Asset Viewer notify the operators and the maintenance personnel.

Computerized Maintenance Management System (CMMS Connectivity)

CMMS Connectivity provides for proper integration of the Computerized Maintenance Management Systems (CMMS) with the system environment. The asset related maintenance information is accessed through standard, pre-configured CMMS views, enabling quick and efficient assessment of maintenance needs and status.

DMS Connectivity for HART devices

DMS Connectivity integrates the calibration device management system (DMS) from Meriam Instruments with the 800xA system, thereby allowing the plant personnel to monitor the field devices for calibration information and streamlining the maintenance workflow.

Device Type Manager (DTM)

A DTM is a configuration and management software component, supplied by the device manufacturer of an intelligent field device or available in form of generic DTM (Basic DTM) to be used for all field devices. The DTM is familiar with the way the device works (plausibility).

The DTM contains graphical user dialogs essential for device configuration, parameterization, diagnostics, maintenance, and supplies additional device specific documentation. DTMs enable offline engineering without requiring the connected field devices. In addition, online engineering with connected field devices is also possible.

The following DTMs are installed during the setup of Device Management PROFIBUS and HART:

- **Basic PROFIBUS DTM**
The Basic PROFIBUS DTM is the runtime environment for device specific applications, created by the Device Integration Center (DIC). As it uses device specific templates, the Basic PROFIBUS DTM also enables custom access to the corresponding device.



Refer to *Device Management Basic PROFIBUS DTM 5.3 (3BDD011938*)* for more information.

- **Basic HART DTM**
The Basic HART DTM can be used for HART device type objects, which does not have a device specific DTM. It provides HART device access for configuration, operation and maintenance based on HART universal and common practise commands.



Refer to *Device Management Basic HART DTM 5.2 (3BDD011939*)* for more information.

- **S800 I/O DTM**
S800 I/O DTM is used for the configuration and diagnosis of specific ABB S800 modules. It is designed for local S800 I/O modules connected to an AC 800M Controller as well as for the S800 Remote I/O, connected through PROFIBUS DP.



Refer to *S800 I/O DTM 5.3(3BSE027630*)* for more information.

- **S900 I/O DTM**
S900 I/O DTM is used for the configuration and diagnosis of ABB S900 modules. It is designed for the S900 Remote I/O, connected through PROFIBUS DP.



Refer to *S900 I/O DTM Version 3.0.x (3BDD010407*)* for more information.

- **CI 854 Communication DTM**
CI 854 Communication DTM is used to establish a communication between Fieldbus Builder PROFIBUS/HART and underlying PROFIBUS device type objects with DTM.
- **ModuleBus Communication DTM**
ModuleBus Communication DTM is used to establish a communication between Fieldbus Builder PROFIBUS/HART and underlying HART device type objects with DTM.

During installation of additional device types through Device Library Wizard the following DTMs may be installed:

- **DD / EDD based DTM**
DD / EDD based DTM is built on the appropriate device DD for use with the associated field devices. Graphical User Interfaces are designed as per the device description.
- **Device specific DTM**
Device specific DTM is a vendor specific DTM designed for the associated field device. It contains the complete knowledge of a specific field device and provides adapted Graphical User Interfaces.



Refer to [Section 5, Device Type Objects in 800xA](#) for detailed information.

HART Multiplexer Connect (optional)

HART Multiplexer Connect integrates specific DTMs for Multiplexer, OPC communication components and HART Multiplexer network objects to the 800xA system. The integration allows to collect, configure, calibrate and diagnosis HART devices, connected to other DCS/PLC than 800xA system which does not allow direct access to (wired and wireless) specific device HART data. Standard HART Multiplexer hardware can be used. As a result the benefit of the HART Device

Integration Library and its aspect functionality can be used also for those HART networks, which are not connected to AC 800M controller.



HART Multiplexer Connect is a option to Device Management PROFIBUS and HART and needs to be ordered separately from the price list.

Refer to [Section 7, HART Multiplexer Connect](#), for more information on HART Multiplexer network configuration.

WirelessHART (Managed Release)

WirelessHART connectivity to 800xA system is a newly introduced functionality in 800xA System.

This functionality enables communication between WirelessHART devices or Wired HART devices through an adapter to the 800xA system.

The connection between Wireless devices and 800xA system is achieved by Pepperl+Fuchs WirelessHART Gateway through Modbus TCP.

Refer to [Section 8, WirelessHART in 800xA System](#) for more information on WirelessHART network.

Product Support

Contact ABB technical support for assistance in reporting the problem.

Section 2 Fieldbus Builder PROFIBUS/HART

The information in this section provides a general description of the Fieldbus Builder PROFIBUS/HART. The standard workflow of this tool is described in *System 800xA Configuration (3BDS011222*)*.

Overview

The Fieldbus Builder PROFIBUS/HART is the core component of the Device Management PROFIBUS and HART software packages and is released for System 800xA.

The Fieldbus Builder PROFIBUS/HART integrates the FDT/DTM technology in the System 800xA and provides the infrastructure in ABB's Aspect Platform to access field devices.

In accordance with the functionality of the DTM, the Fieldbus Builder PROFIBUS/HART accesses field devices for

- Configuration
- Parameterization
- Diagnostics
- Maintenance
- Documentation

The current version of the Fieldbus Builder PROFIBUS/HART supports the FDT 1.2 and addendum standard interfaces.

The Fieldbus Builder PROFIBUS/HART supports the following functions in the hardware topology of the *Control Structure* in the Plant Explorer:

- Saving and reading DTM instance data set.
- Configuration of the OPC Server PROFIBUS/HART.
- Provision of DTM internal instance data for bulk data applications (if supported by the DTM).
- Support of 800xA System Audit Trail interface.
- Topology planning and managing the fieldbus structure down to PROFIBUS and HART devices.
- Managing (add, move, remove, or copy) PROFIBUS devices connected to AC 800M / CI854 and HART devices connected to local I/O, remote I/O or Multiplexer.
- Assigning the HART devices to I/O channels.
- DTM call up from System 800xA nodes.
- Configuring and removing the communication paths for online communication between the DTM and the physical field device in the system.
- Comparing field device online and offline data.
- Uploading/downloading the current DTM instance data and device commissioning.
- Exporting/importing device instance data records.
- Historical data set storage to document the life cycle of the device instance.

FDT 1.2 User Roles

FDT standard defines user roles such as Administrator, Planning Engineer, and Operator. Each user role has the access privileges to execute the activities of the relevant work area. For example, user with user role Planning Engineer can do online parameter changes, simulate or force the values. User with user role Operator has limited access to observe the process values and device configuration parameters in non editing mode.

User roles are important for implementing security while working with DTMs.

FDT standard defines the following user roles:

1. [OEM Service](#).
2. [Administrator](#).
3. [Planning Engineer](#).
4. [Maintenance](#).
5. [Operator](#).
6. [Observer](#).

OEM Service

The **OEM Service** user role can perform all the DTM specific functions. For example, resetting the internal counters and exchanging firmware. Special password protection may be enabled for this service.

Administrator

The **Administrator** user role can perform the administrative operations in an engineering environment. This user is responsible for adding and removing of software components.

Planning Engineer

The **Planning Engineer** user role will have complete access privileges. This user can access all the functions of Frame Application and can use DTM functions. Only OEM-specific operations are locked.

A Planning Engineer performs various tasks such as parameterization, simulation, creation, and deletion of device instances and calibration.

Planning Engineer user role inherits Maintenance user role.

Maintenance

The **Maintenance** user role can perform all the required maintenance operations such as device exchange, tuning, calibration, and adjustment. This user can download the verified parameter sets, modify a subset of parameters online or

offline, perform device-specific online operations and at the end of the processing, may have the possibility to upload the complete parameter set.

Maintenance user role inherits Operator user role.

Operator

The **Operator** user role can observe and manage the process. The operator can check the current status of a device, process variable and diagnostics. The operator can also acknowledge the alarms.

Operator user role inherits Observer user role.

Observer

The **Observer** user role can observe the current process. This user do not have access to any other activities.

FDT 1.2 User Roles in 800xA

The 800xA system user roles are converted to user roles conforming to FDT in accordance with the following table and are transferred to the DTM when it is called.

An **Application Engineer** user role includes all the functionalities in a DTM to offer for a **Planning Engineer** user role. Similarly, **Guest** user role is mapped to **Observer** user role.

800xA Permissions	Mapped 800xA user groups (default setting)	FDT 1.2 User roles						800xA DTM Operations Observed assignment, but this depends on the implementation in the DTM			
		OEM Service <small>(optional setting)</small>	Administrator <small>(optional setting)</small>	Planning Engineer	Maintenance <small>(Planning Engineer does include Maintenance role)</small>	Operator	Observer	Enable Communication	Upload	Download	Configure/Force
Administrate	Administrators	X	X	X				X	X	X	X
FDT Configure	Application Engineers			X				X	X	X	X
FDT Operate	Operators					X		X			
FDT Maintain	System Engineers				X			X			
FDT Observe	Everyone / Guest						X	X			

Figure 2. User Roles in 800xA

In accordance with FDT, the DTM decides the functions which are activated by each user role.



In accordance with FDT 1.2, the DTM decides which functions are activated by which user role.

800xA Security and Permission Concept

The 800xA security model is based on the extension to Windows security model. Use this extension to set permissions for the users of 800xA system, structure or an aspect object. Also, the security setting can be extended to a node. Therefore, the same user gets different access privileges on different nodes in the same 800xA system.

The 800xA security model implements the concept of user roles and permissions to control the access to users.

Certain user role allows the user to view the object. User may not be able to perform the operations even after having access to the required user role. The user must have appropriate permissions. For example, two application engineers with same user role can have different access rights on a specific device.

Permissions are set using the **Security Definition** aspect. For more details on 800xA security and the **Security Definition** aspect, refer to *System 800xA Administration and Security (3BSE037410*)*.

The 800xA system has certain permissions by default. For example, Read, Operate, Configure, and Administrate. The system extension of Fieldbus Builder PROFIBUS/HART provides additional permissions in order to have a full functional security model with respect to FDT/DTM:

- FDT-Configure.
- FDT-Observe.
- FDT-Operate.
- FDT-Maintain.

Device Management PROFIBUS and HART related aspects such as **Device Management**, **Fieldbus Management**, and **Property Management** have the user role binding (Figure 3) and permissions (Figure 4) set by default.

Index	User Role	Description
Read		Read
Modify	Application Engineer Role	Modify
Create	Application Engineer Role	Create
Config View	Software Developer Role	Config View
Operate	Operator Role	Operate

Figure 3. User Role Bindings Tab

With above default settings it is possible to map 800xA user roles and FDT user roles correctly and flexibly.

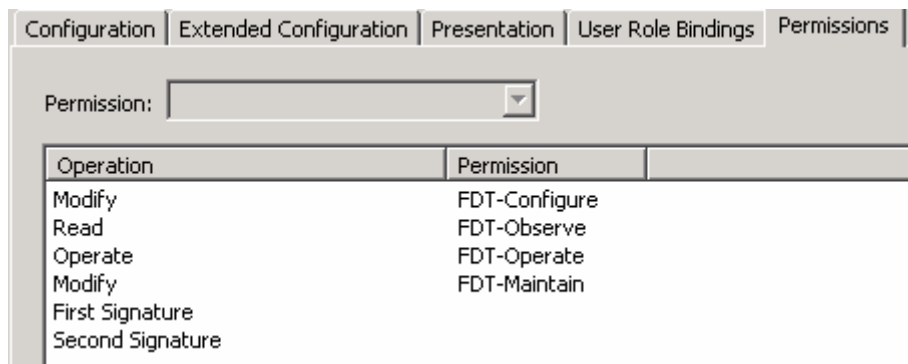


Figure 4. Permissions Tab

Configuration Example

Following examples describe how permission control can be realized with respect to FDT/DTM.

1. **Application Engineer** and **Senior Application Engineer** have different access rights on a device.

This example includes two users, **Application Engineer** and **Senior Application Engineer**. **Application Engineer** has only observe rights and **Senior Application Engineer** has complete access rights on the device types.

To understand this use case, create the **Security Definition** aspect on the root level and select the **Security Definition** aspect. Permissions window appears as shown in [Figure 5](#).

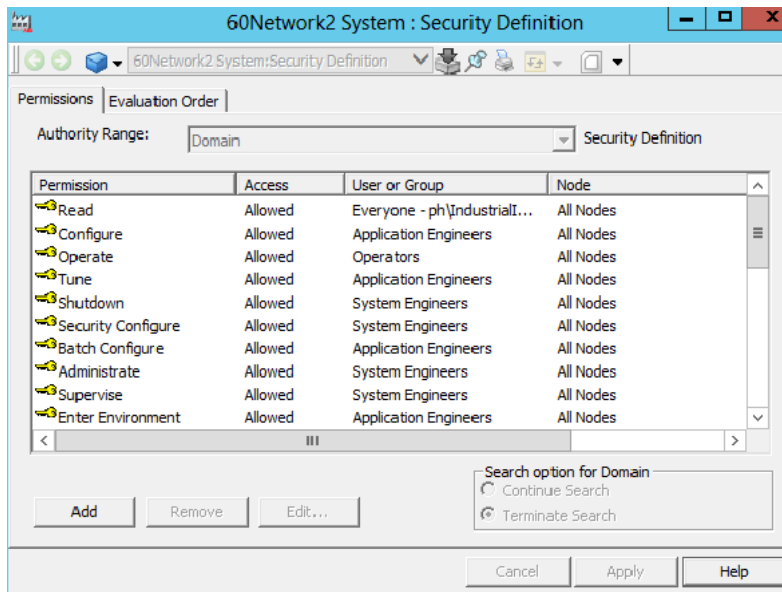


Figure 5. Permissions

The **Appeng** user has the **FDT-Observe** permission and denied for any other permission. The **SrAppeng** user has all the permissions.

With this configuration **SrAppeng** user is mapped to FDT Planning Engineer and has access to all the functions as shown in [Figure 6](#).

The screenshot shows the 'Parameter' dialog box in the Fieldbus Builder software. The dialog is titled 'Parameter' and is part of the 'tydr:Device Management' application. It contains several sections:

- Device:** Message: DOWN3, Long Tag: -/-, Descriptor: ASDF, Transducer Serial No.: 0, Final Assembly No.: 0.
- Primary Variable PV:** Primary Variable Units: %, Range Units: mbar, Lower Range Value: 0, Upper Range Value: 399, Transfer Function: Linear, Damping [s]: 0.123.
- Communication:** Polling Address: 0, Tag: GH, Date of Last Change: 5/14/2013, Config Change Counter: 0.

The dialog also has 'Ok', 'Cancel', 'Apply', and 'Help' buttons at the bottom. The user 'PH\800xainstaller/Planning Engineer' is logged in, and the ABB logo is visible in the bottom right corner.

Figure 6. Parameter

The **Appeng** user is mapped to FDT Observer and has only read access as shown in [Figure 7](#).

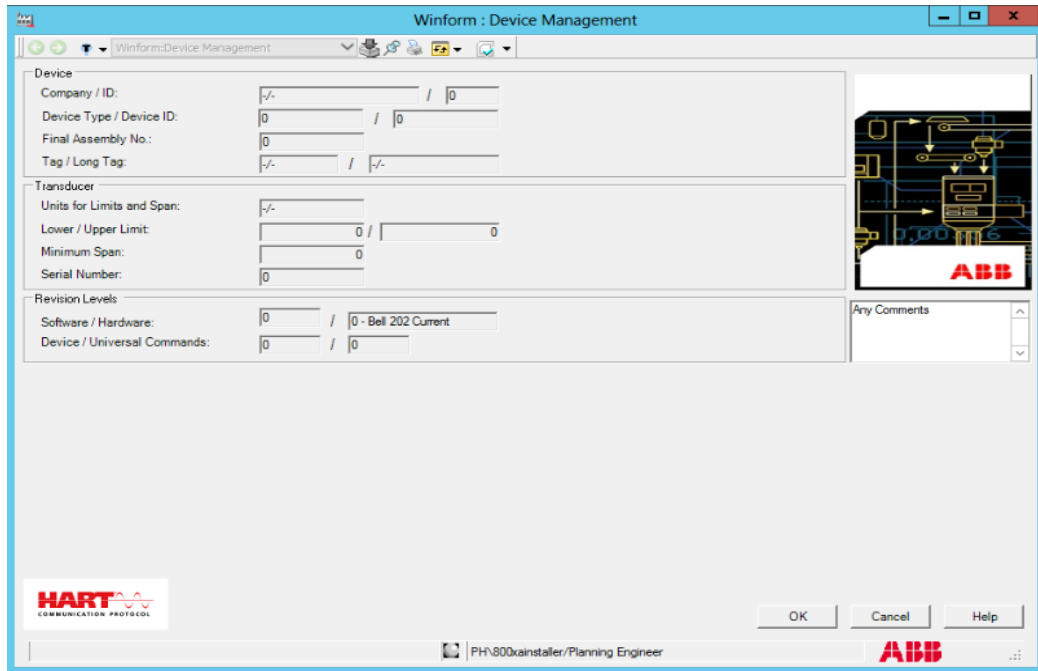


Figure 7. Window Visible to Appeng/Observer

2. A node is made completely read only independent of the user logged in.
In this example, there is one read only 800xA node. It is considered where independent of user logged in the device types are shown in observe mode.

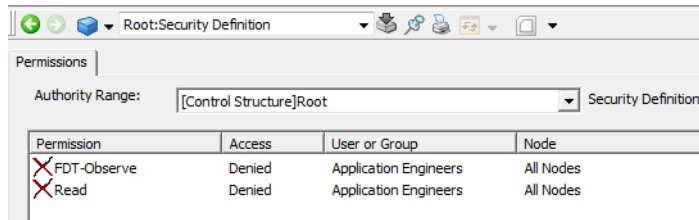
Permission	Access	User or Group	Node	Audit
FDT-Configure	Allowed	SrAppeng	All Nodes	
FDT-Maintain	Allowed	SrAppeng	All Nodes	
FDT-Observe	Allowed	Appeng	All Nodes	
FDT-Observe	Allowed	SrAppeng	All Nodes	
FDT-Operate	Allowed	SrAppeng	All Nodes	
FDT-Maintain	Denied	Appeng	All Nodes	
FDT-Configure	Denied	Appeng	All Nodes	
FDT-Operate	Denied	Appeng	All Nodes	
FDT-Configure	Denied	Everyone - IndustrialITUser	DLW-AS	
FDT-Maintain	Denied	Everyone - IndustrialITUser	DLW-AS	
FDT-Observe	Allowed	Everyone - IndustrialITUser	DLW-AS	
FDT-Operate	Denied	Everyone - IndustrialITUser	DLW-AS	

Figure 8. Permissions

With the above setting, the user cannot modify the DTM if logs on to the "DLW-AS" node independent of his user role.

3. Device Management aspect is not allowed to be accessed by an user.

In this example, the Device Management aspect is configured for Application Engineer to be not accessible. To do this, just by denied 'Read' permission access will not be sufficient. Additionally, 'FDT-Observe' permission also has to be denied for this user.



Permission	Access	User or Group	Node
FDT-Observe	Denied	Application Engineers	All Nodes
Read	Denied	Application Engineers	All Nodes

Figure 9. Security Definition



Changes in Security Definition aspect during run time of DTM will not affect DTM behavior. Plant Explorer need to be closed and reopened in order to take effect of new permission configuration on DTMs.

Fieldbus Builder PROFIBUS/HART Aspects

Aspect Overview

Once the Fieldbus Builder PROFIBUS/HART has been installed, it is available as a new aspect system. The aspect system adds the following aspects to the 800xA system:

Table 1. Fieldbus Builder PROFIBUS/HART Aspects

Aspect	Function
Device Definition	This aspect allows an installed DTM to be assigned to a specific object in the <i>Object Type Structure</i> .
Device Management	This aspect starts the DTM with its instance data in the <i>Control Structure</i> .
FBEntityCategory	This aspect is required for Distributed Engineering in the 800xA system environment, if PROFIBUS or HART devices are not connected to an AC800M controller, but connected to other network structures such as HART Multiplexer Network.
FBB FileSync Helper	This aspect is used to handle 800xA systems backup/restore function in connection with Device Management PROFIBUS and HART. The last Backup/Restore time is displayed in the standard view.
Fieldbus Management	This aspect opens the graphical user interface of the Fieldbus Builder PROFIBUS/HART in the <i>Control Structure</i> .

Table 1. Fieldbus Builder PROFIBUS/HART Aspects (Continued)

Aspect	Function
Module Definition	<p>For DTMs with internal module planning.</p> <p>This aspect is used to assign a module with a unique ID for the corresponding master DTM and is only visible in the <i>Object Type Structure</i>.</p> <p>It is required for modular DTMs (module planning takes place within the DTM) in order to identify the modules in the Plant Explorer uniquely, and to position and present them.</p>
Module Management	<p>For DTMs with internal module planning.</p> <p>This aspect is used by the Fieldbus Builder PROFIBUS/HART to save instance-specific data for a module and is only visible in the <i>Object Type Structure</i>.</p>
PROFIBUS Management	<p>This aspect allows the access to the AC 800M/CI854 web server for all connected PROFIBUS CI854 modules on this controller in the <i>Control Structure</i> below AC800M.</p> <p>The aspect has been installed through Web Page Aspect System.</p>
Property Management	<p>This aspect allows access to the instance data set of the DTM if the DTM supports this function. It can be used for bulk data applications</p>

Additional aspects are described in [Section 3, OPC Server PROFIBUS/HART](#).

The Fieldbus Builder PROFIBUS/HART aspect system can be found under:

Aspect System Structure > Fieldbus Builder PH

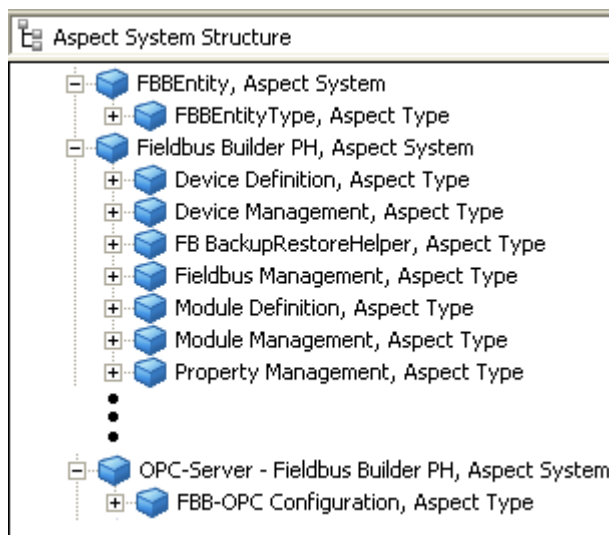


Figure 10. Aspect System Structure

As illustrated in [Figure 10](#), the aspect system for Device Management PROFIBUS and HART is divided into three system entries.

The system entry **FBBEntity** contains aspects required for Distributed Engineering in the 800xA system environment. Engineering of PROFIBUS or HART devices can be performed with a reservation of the specific device type object or superordinate object types only. This aspect enables the reservation/release functionality of device type objects not placed below AC 800M Control Networks (for example, HART Multiplexer Networks, etc.).

The system entry **Fieldbus Builder PH** contains aspects required for working with device type objects and for their configuration.

The system entry **OPC-Server - Fieldbus Builder PH** contains an aspect for accessing internal device data through OPC communication. Additional information about OPC can be found in [Section 3, OPC Server PROFIBUS/HART](#)



Unless described in more detail, the aspects of the Fieldbus Builder PROFIBUS/HART are configured and may not be modified by the user. ABB Service must be informed before the user makes any changes to the aspects described in this document.

Aspects in the Object Type Structure

The *Object Type Structure* contains the device objects to be used in the projects. The individual device type objects are described in the [Section 5, Device Type Objects in 800xA](#).

Objects in the *Object Type Structure* managed using the Fieldbus Builder PROFIBUS/HART must have the following aspects:

- Device Definition
This aspect assigns the DTM to the object
- DIP Fieldbus Builder PH Extension Definition
This aspect handles the Fieldbus Builder aspects during instantiation



The aspects described here are configured for the device type objects supplied with the Device Library Wizard and do not need any other settings. Unless indicated otherwise, these aspects are designed to be used for developing new device type objects, which may only be implemented in an 800xA system once they have been approved by ABB. Contact ABB Services.

Device Definition Aspect

The **Device Definition** aspect is used to assign the installed DTM to the specific device type object in the *Object Type Structure*.

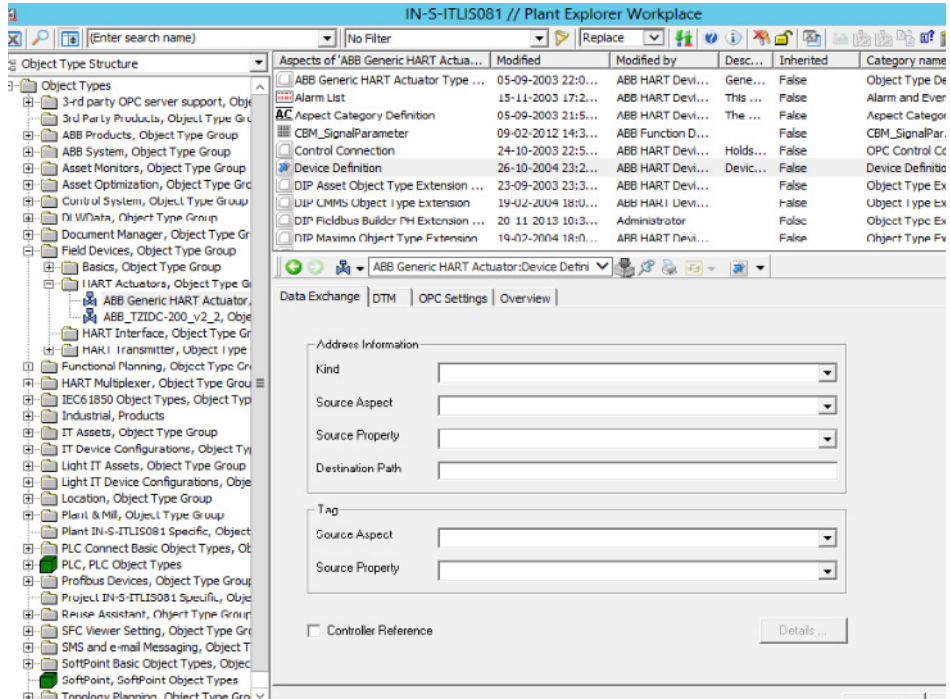


Figure 11. Device Definition Aspect in the Object Type Structure



All DTMs used should be installed for subsequent operations. Third-party manufacturer DTMs are not subject to ABB license conditions. Additional information can be found in [Section 5, Device Type Objects in 800xA](#).

Once the Device Definition aspect has been selected, a Fieldbus Builder PROFIBUS/HART window will appear containing four tabs:

- Data Exchange
- DTM
- OPC Settings

- OverviewData Exchange Tab

Address information for the field device is configured here and transferred to the DTM. Some DTMs may use a format not specified in the FDT for transferring address information. These may be DTMs, which, for example, use proprietary protocols such as internal module bus protocols for remote I/O.

The screenshot shows a software interface for configuring data exchange settings. It features a tabbed interface with 'Data Exchange' selected. The 'Address Information' section includes dropdown menus for 'Kind', 'Source Aspect', 'Source Property', and a text field for 'Destination Path'. The 'Tag' section includes dropdown menus for 'Source Aspect' and 'Source Property'. A 'Controller Reference' checkbox is present, along with a 'Details...' button. The bottom of the window contains 'Cancel', 'Apply', and 'Help' buttons. A watermark for 'Activate Windows' is visible in the background.

Figure 12. Data Exchange Settings



Do not change the settings in this tab, if not described otherwise.

DTM Tab

The user can use the **DTM** tab to assign a specific DTM to a device type object in the *Object Type Structure* of the Plant Explorer.

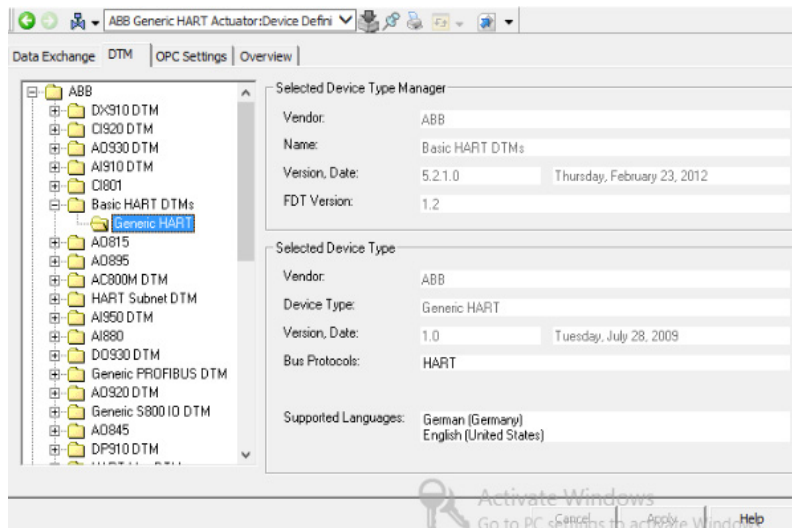


Figure 13. DTM Selection on the Device Object Type

Once the **Device Definition** aspect has been selected, the Fieldbus Builder PROFIBUS/HART browses the Microsoft Windows Operating System Registry for all installed DTMs. The initial execution of this function may take some time, depending on the number of installed DTMs.

Once the Fieldbus Builder has completed its search of the Registry, the installed DTMs are sorted according to manufacturer. The selected DTM displays the data it contains relating to the vendor and device type.



The installed DTMs are now called for the first time. This is a way of checking that the DTM has been installed correctly.

New installed DTMs can only be shown after restart of the Device Management Server, visible in Windows Task Manager as **DeviceManagementServer** process.

OPC Settings Tab

The **OPC Settings** tab is for an additional assignment of an OPC DTM to a field device object in order to make device data available to higher-level applications through OPC access. For this purpose, an OPC-compatible DTM is selected from the proposed DTM list.

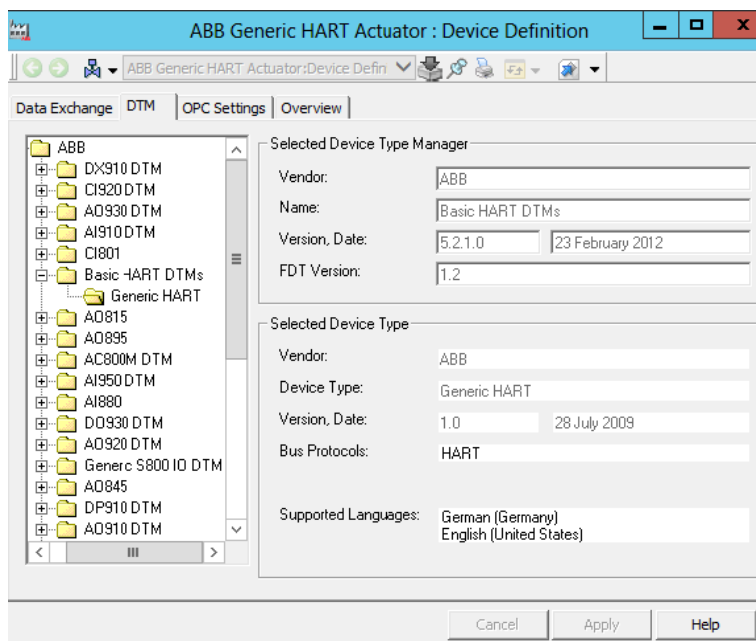


Figure 14. OPC Access Settings

See [Section 3, OPC Server PROFIBUS/HART](#) for detailed information.

Overview Tab

The **Overview** tab lists the DTMs installed on the system node with DTM-specific information. Should ABB service be required, the overview provides a means of evaluating the required DTM information quickly.

Type Name	Vendor	Manufacturer ID	Device Type ID	Sub-Device Type	Version	Date
Dx910* (DI08)	ABB		1	4	6.0.2	2013-10-22
Dx910* (DI08 S)	ABB		1	5	6.0.2	2013-10-22
Dx910* (DI08 8I)	ABB		1	6	6.0.2	2013-10-22
Dx910* (DI08 8I...)	ABB		1	7	6.0.2	2013-10-22
CI920* (CIFB)	ABB		0	2	6.0.2	2013-10-22
AO930* (AO4H)	ABB		6	27	6.0.2	2013-10-22
AO930* (AO4H 1...)	ABB		6	28	6.0.2	2013-10-22
AO930* (AO4H 4...)	ABB		6	29	6.0.2	2013-10-22
AO930* (AO4H 8...)	ABB		6	30	6.0.2	2013-10-22
AI910* (AI4)	ABB		11	35	6.0.2	2013-10-22
CI801	ABB	26	2259	Not applicable	5.3	2012-06-11
FDS Port	PEPPERL+FU...			(Id. Device.Fds...	2.1.0.1919	2008-04-09
VEGAPULS 68 ...	VEGA Grieshab...	98	25302	11168	4.40	
Generic HART	ABB	0	0		1.0	2009-07-28
AO815	ABB	0	0	Not Applicable	5.3	2012-06-11
AO895	ABB	0	0	Not Applicable	5.3	2012-06-11
HART Subnet	ABB				5.8.0	2008-01-31
AI950* (TI4 R)	ABB		7	40	6.0.2	2013-10-22
AI950* (TI4 T)	ABB		7	41	6.0.2	2013-10-22
AI880	ABB	0	0	Not Applicable	5.3	2012-06-11
DO930* (RO6)	ABB		14	15	6.0.2	2013-10-22
FieldConnex Dia...	PEPPERL+FU...			(Id. Device.Fds...	2.1.0.1919	2008-04-09
AO920* (AO4I)	ABB		5	39	6.0.2	2013-10-22

Figure 15. Overview of installed DTMs



No settings can be made in this tab.

DIP Fieldbus Builder PH Extension Definition Aspect

The **DIP Fieldbus Builder PH Extension Definition** aspect is linked to device type objects in the *Object Type Structure* when the PROFIBUS and/or HART Device Integration Library system extension is loaded.

The aspect contains instantiation rules for the device type objects tested by the Fieldbus Builder PROFIBUS/HART when the type is inserted in the *Control Structure*.

This aspect does not require any further configuration by the user.

Aspects in the Control Structure

The main user interface for the Fieldbus Builder PROFIBUS/HART is the *Control Structure* of the Plant Explorer. Within the *Control Structure*, the Fieldbus Builder PROFIBUS/HART is controlled by means of the following aspects:

- Fieldbus Management
- Device Management
- Property Management
- PROFIBUS Management
- FBB FileSync Helper

All plans for field device type objects (including eventual startup) are to be made in the *Control Structure* of the Plant Explorer with the **Fieldbus Management** aspect. The Fieldbus Builder PROFIBUS/HART works exclusively in conjunction with this structure.

Fieldbus Management Aspect

This aspect is used to open the graphical user interface of the Fieldbus Builder PROFIBUS/HART in the window.

Fieldbus Management is to be used:

- to assign HART field devices to I/O module channels with HART functionality
- to manage the communication operating modes (offline / online)

The user interface comprises 4 areas:

- Fieldbus Tree Window
- Object Information Window
- Status Bar
- Message Window

Additionally to the Message Window area the View Status Messages Window displays a list of history messages. Filter options can be set to reduce message information. For details refer to [View Status Messages Window through Fieldbus Management](#) on page 61.

Fieldbus Tree Window

The **fieldbus tree** window displays the fieldbus structure part of the *Control Structure* along with the channel information from the parent object (higher-level object).

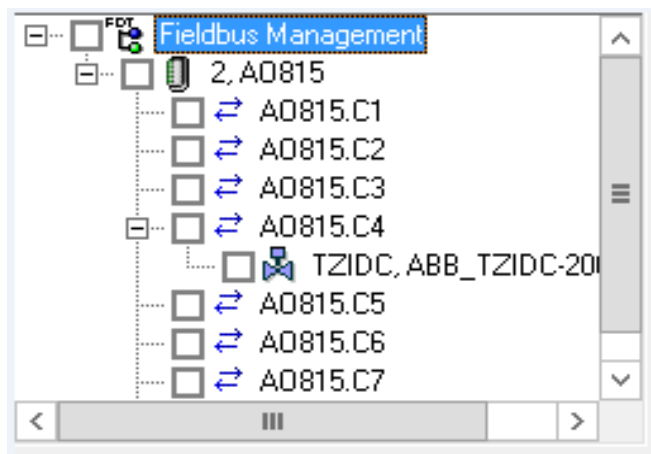


Figure 17. Fieldbus tree window

The following functions are made available to the user in the fieldbus tree window:

- Changing of the Fieldbus Management mode (Communication disabled/enabled)
- Channel assignment of field device objects to the parent object (I/O mapping)
- Expansion of fieldbus topology in the fieldbus tree window
- Selection of a number of field device objects for automated processing
- Configuration of the OPC Server PROFIBUS/HART for field devices
- DTM functions including Download, Upload, Verify, Compare (if supported by the DTM)
- Import and export of instance data for each device type object



The properties described above can be accessed through context menus and can be displayed by selecting the object node and clicking with the right mouse button.

Context Menu in the Fieldbus Tree

Depending on the object node selected, the user is offered various context menus. The fieldbus tree differentiates between 3 types of node:

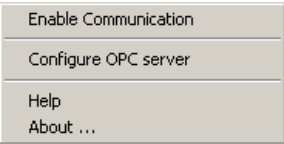
- Fieldbus Management node
- This is always the master node in the fieldbus tree window.
- Channel objects
- Instead of displaying address information, channel objects are identified by an icon representing two arrows pointing in opposite directions.
- Device objects
- Device objects in the fieldbus tree always display a device address in the form of an integer number or a tag name.



Context menu entries are activated/deactivated on the basis of the user role as well as the communication mode (Communication disabled/enabled).

Fieldbus Management node

The Fieldbus Management master node element in the fieldbus tree window provides access to general settings for the Fieldbus Builder PROFIBUS/HART through the context menu.

Context menu	Field	Function
	Communication enabled	The absence of a tick beside Communication enabled indicates that the fieldbus tree is in Communication disabled mode. This is also indicated in the status bar.
	Configure OPC Server	Reads the fieldbus topology and transfers this to the OPC Server PH.
	Help	Calls the help function
	About...	Displays Fieldbus Builder PROFIBUS/HART license and revision information

Communication disabled mode is activated by default. Depending on the mode selected, the DTMs will offer the user various functions.

Table 2. Fieldbus Management modes

Mode	Function
Communication disabled mode	For planning and changing the fieldbus structure
Communication enabled mode	Activates all functions required for communication with the field devices



The selected mode applies to the entire fieldbus line, as far as the master nodes.

Changing from **Communication enabled** to **Communication disabled** mode may take some time if communication with field devices is still active.

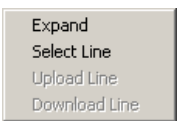
The disconnection of the data path is indicated by a progress bar in the status bar.



If the tree is active in **Communication enabled** mode, the user may not modify the fieldbus topology. This means that no new devices can be integrated into the active topology and no address modifications can be made directly on the object.

Channel object

Channel object mode enables the user to display lower-level fieldbus structures quickly and to select device objects on the same layout level. Selected device objects are processed through the operational routine of the Fieldbus Builder PROFIBUS/HART, i.e. the DTM parameter set is loaded from the device to the instance data set or written from the data set to the device (upload/download) as long as the DTM supports this function. Channel objects are identified by an icon representing two arrows pointing in opposite directions.

Context menu	Field	Function
	Expand	Expands the topology tree below the channel object node.
	Select Line	This function can be used to select all device objects on the same level.
	Upload Line	This function calls the selected DTMs without GUI, reads the current data from the fieldbus devices, and uses this as the new instance data. The function is only available in Communication enabled mode.
	Download Line	This function calls the selected DTMs without GUI and downloads the instance data to the fieldbus devices. The function is only available in Communication enabled mode.

Device object

The context menu for the device object node features DTM functions without GUI specific to the object and the lower-level sub tree structure. The context menu enables the selection of lower-level fieldbus structures and their device objects. As long as the DTMs support the services offered, device object data can be read or written or parameters in the device and in the instance data set simply compared.



Note that some of the menu items in the context menu may not be supported by a DTM (Example: Online Compare).

Context menu	Field	Function
	Expand	Expands the topology tree below the channel object node.
	Import	Imports the device specific instance data set from a file.
	Export	Exports the device specific instance data set to a file. This feature can be taken to save historical data sets to document the life cycle of the device instance record
	Verify Device	The DTM is called without application (GUI) to verify the instance data record. The result (either "OK" or "Error") is logged in the message window as "Data set valid/invalid".
	Verify Selection	All selected device objects with their DTMs are called without application (GUI) to verify the instance data record. The result (either "OK" or "Error") is logged in the message window as "Data set valid/invalid".
	Help	

Context menu	Field	Function
	Upload Device	<p>This function calls the DTM without application (GUI), reads the current data from the fieldbus device, and uses this as the new instance data.</p> <p>The function is only available in Communication enabled mode.</p>
	Upload Selection	<p>This function calls the DTMs of the selected objects without application (GUI), reads the current data from the fieldbus devices, and uses this as the new instance data.</p> <p>The function is only available in Communication enabled mode.</p>
	Download Device	<p>This function calls the object DTM without application (GUI) and downloads the instance data to the fieldbus device.</p> <p>The function is only available in Communication enabled mode.</p>
	Download Selection	<p>This function calls the selected object DTMs without application (GUI) and downloads the instance data to the fieldbus devices.</p> <p>The function is only available in Communication enabled mode.</p>
	Online Compare Device	<p>This function calls the object DTM without application (GUI). The DTM ensures that the online data is read from the field device and compared with the instance data.</p> <p>The result "Compare finished with Data equal/Data not equal" with a list of differences (part of the DTM) is logged in the message window.</p> <p>In the event of conflicts (errors) in the data records, a detailed analysis can be carried out by calling the DTM with its GUI.</p> <p>The function is only available in Communication enabled mode.</p>

Context menu	Field	Function
	Online Compare Selection	This function calls the selected object DTMs without application (GUI). The function is the same as Online Compare Device, but here for the complete selected device objects. The function is only available in Communication enabled mode.
	View Status Messages	Selecting this function opens a new window, which displays messages triggered by DTMs or Fieldbus Builder PH. Filter option for specific message types, device objects, time events and system nodes can be set.
	Help	Calls the help function

Object Information Window

The object information window contains detailed information about one or more device objects, according to the selection in the fieldbus tree window. Principally, during a bulk process, the process status as well as information about the individual device objects will be displayed to the user. Every device displayed is set up as a dynamic element, i.e. only the last current status is ever displayed.



The current status overwrites the previous status with new parameters. Parameters may therefore toggle in the window.

	Description	Type	Object	Tag	Address	Vendor
	DTM	A1895	1	-/	N/A	ABB Automation Techn
	DTM	ABB_TH02_Basic	ABB_Gen_HART_Act1	-/	0	ABB Automation

Figure 18. Object information window

Table 3. Object information window functions

Field	Functions
Status Icon	The current status of the bulk process is displayed. If several messages are pending, only the message with the highest priority is displayed. Prio.1 Error Prio.2 Message Prio.3 Information
Description	Indicates whether the object is a module, a channel or a DTM.
Type	Indicates the DTM type read from the DTM.
Object	Object name in the <i>Control Structure</i> of the Plant Explorer.
Tag	Device-internal tag name. Read from the device.
Address	The module or bus address
Vendor	Indicates the DTM vendor.

Status Bar

The status bar indicates the current Fieldbus Management mode (Communication disabled/enabled) as well as the time characteristic of any DTM actions executed.

Table 4. Fieldbus Management status bar

Field	Functions
Icon, mode	The current mode (Communication disabled or enabled) appears here.
Progress bar	<p>Progress bars appear for functions requiring lengthy execution times. This progress bar does not indicate the execution progress. It only indicates that a function is being executed.</p> <p>For example, the Fieldbus Builder PROFIBUS/HART starts the appropriate DTM for downloading an instance data record to a HART field device. The DTM itself downloads the data and only the DTM knows the current status of the download process.</p> <p>The DTM only notifies the Fieldbus Builder PROFIBUS/HART at the end of the process if the download was successful or was terminated with errors. This is logged in the message window.</p>

Message Window

The message window indicates the current status of actions executed, which were defined in the fieldbus tree.






	Time	Object	Message
	5/22/2006 11:21:44...	ABB_Gen_HA...	Compare finished: Data NOT equal
	5/22/2006 11:21:35...	ABB_Gen_HA...	Online compare started
	5/22/2006 11:20:41...	1, AI895	Compare finished: True
	5/22/2006 11:20:41...	1, AI895	Online compare started
	5/22/2006 11:20:31...	1, AI895	Data set valid

Figure 19. Message window

Table 5. Message window functions

Field	Functions
Status Icon	<p>The error, warning or information icon appears here.</p> <ul style="list-style-type: none"> • Errors means fatal problem mostly in device communication between device and DTM. This message is sent by the DTM or Fieldbus Builder PH. • Warnings means general problems in interaction between device and DTM. Those messages will not affect the system but can result in inconsistent data. This message is sent by the Fieldbus Builder PH. • Informations means general user and DTM interaction, which can be a started or ended process. This message is sent by the Fieldbus Builder PH. <p>Messages from the DTM are displayed in the Object column with the object instance name as identifier only, whereas messages from the Fieldbus Builder PH includes additionally the identifier of the device type, for example, <i>T1101.GenericHartTransmitter or 1,A1895</i></p>
Time	The date and time for the result is entered.
Object	Object name, from which the message is triggered.
Message	Message text for the result

Refer to [Appendix A, Error Messages](#) for details of different messages that can appear.



Select a field to sort the entries. Select the same field again to invert the sort.

View Status Messages Window through Fieldbus Management

The View Status Messages window allows to filter and to show a set of particular messages triggered from DTMs or Fieldbus Builder PROFIBUS/HART.

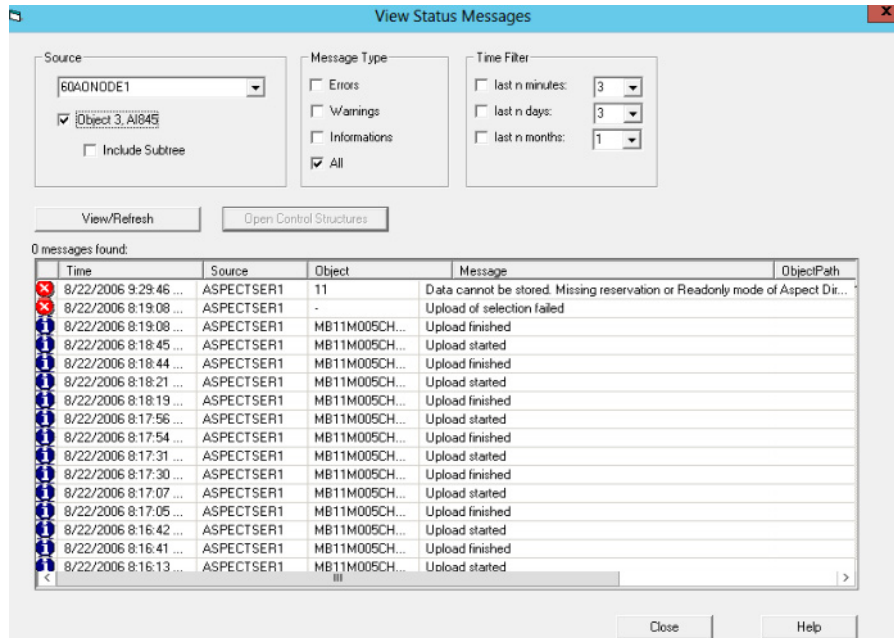


Figure 20. View Status Message Window

The following filter options can be set by the user:

Area	Field	Function
Source	System Node	<p>The user can select the node, from which the messages shall be displayed. It is possible to get a list of messages from all system nodes, if <all nodes> is selected.</p> <p>The system node, where this window has been opened from, is selected by default.</p>
	Object selection	<p>Enable this check box, if the messages shall be shown related to this device type object only.</p> <p>If this check box is disabled, all messages are shown from the selected system node.</p> <p>The device type, where this window has been opened from, is selected by default.</p>
	Subtree selection	<p>Enable this check box to get additional messages from device types located below the selected device type object.</p> <p>If this check box is enabled, other filter options cannot be used.</p> <p>By default this check box is disabled.</p>

Area	Field	Function
Message Type	Errors	<p>Errors means fatal problem mostly in device communication between device and DTM. This message is sent by the DTM or Fieldbus Builder PH.</p> <p>This filter cannot be used, if the Subtree selection is enabled.</p>
	Warnings	<p>Warnings means general problems in interaction between device and DTM. Those messages will not affect the system but can result in inconsistent data. This message is sent by the Fieldbus Builder PH.</p> <p>Messages from the DTM are displayed in the <i>Object</i> column with the object instance name as identifier only, whereas messages from the Fieldbus Builder PH includes additionally the identifier of the device type, for example, <i>T1101.GenericHartTransmitter or 1,AI895</i></p> <p>This filter cannot be used, if the Subtree selection is enabled.</p>
	Informations	<p>Informations means general user and DTM interaction, which can be a started or ended process. This message is sent by the Fieldbus Builder PH.</p> <p>This filter cannot be used, if the Subtree selection is enabled.</p>
	All	<p>Select this check box to get a list of all messages, covering errors, warnings and informations.</p>

Area	Field	Function
Time Filter	<Time selection>	This function allows the user to select a certain point of time, from which all messages shall be displayed. Selection of one check box is only possible, which represents the filter for minutes, days or months. This filter cannot be used, if the Subtree selection is enabled.
Button	View	Lists all messages according filter option selection. This button can also be used as refresh function for the window.
	Close	Closes the window.
	Help	Calls the help function

The message window indicates the status of actions executed according filter options chosen by the user.

Table 6. Message window functions

Field	Functions
Status Icon	The error, warning or information icon appears here.
Time	The date and time for the result is entered.
Source	The source is the system node, from which the messages are read. Select <All Nodes> to get system wide list of messages from all connected system nodes.
Object	Object name, from which the message is triggered.
Message	Message text for the result

Click the View button to refresh the list according filter options.

Device Management Aspect

The **Device Management** aspect opens the associated DTM (see [Device Definition Aspect](#) on page 44) in the main or separate window with the instance data record.



In Device Management, the Fieldbus Builder PROFIBUS/HART operates in the background and cannot be seen by the user. Its primary task is to call the associated DTM and supply it with data, and to ensure that the instance data is saved to the Aspect Server directory.

The **Default View** will be displayed as long as there is no DTM graphical user interface available and during a DTM application change.

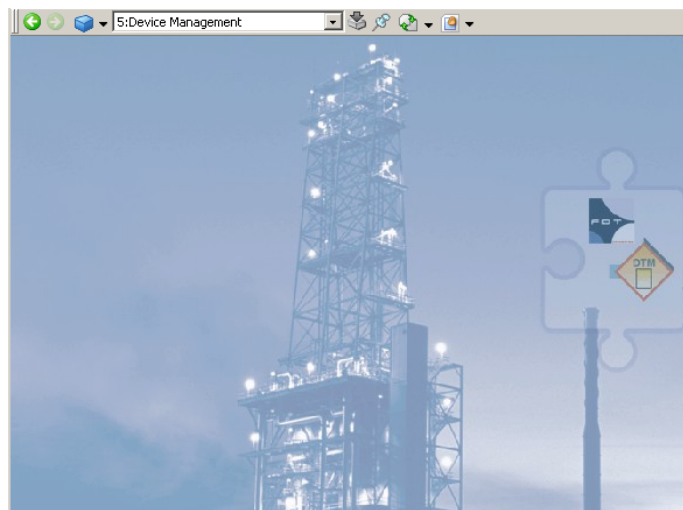


Figure 21. Default View

DTMs can be started in **Communication disabled** mode to configure field device objects or, if changes are to be made directly in the device, in **Communication enabled** mode. Depending on the mode, the DTM will appear with various functional windows. The various modes are selected through the **Fieldbus at Management** aspect of the relevant device object.

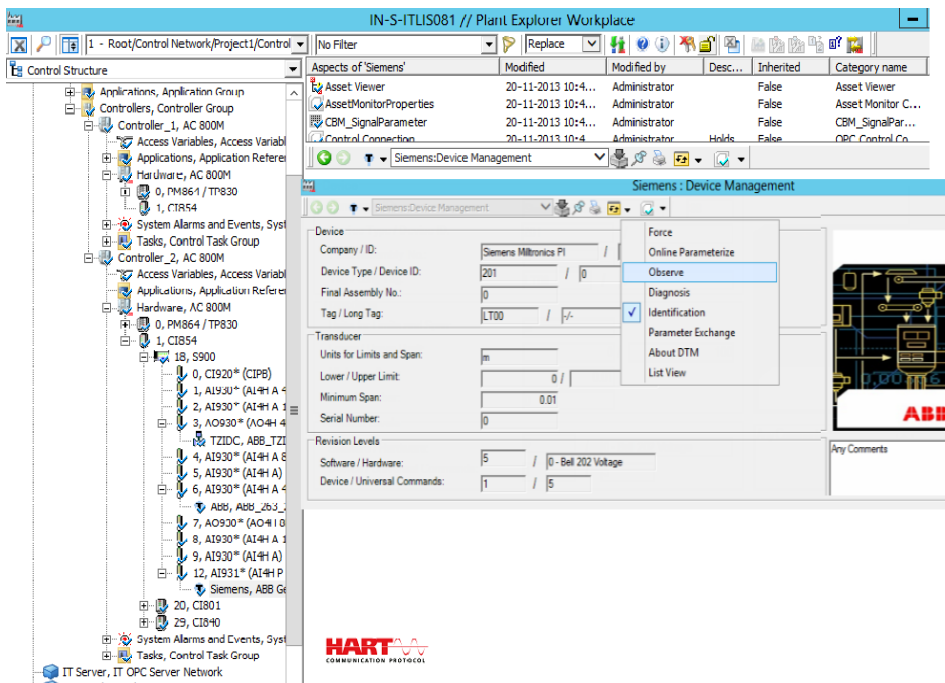


Figure 22. Device Definition aspect with open DTM



Communication enabled mode starts all DTMs required for the communication sequence. Individual DTMs in this connection sequence can then not switch to **Communication disabled** mode without affecting other DTMs started in this sequence.

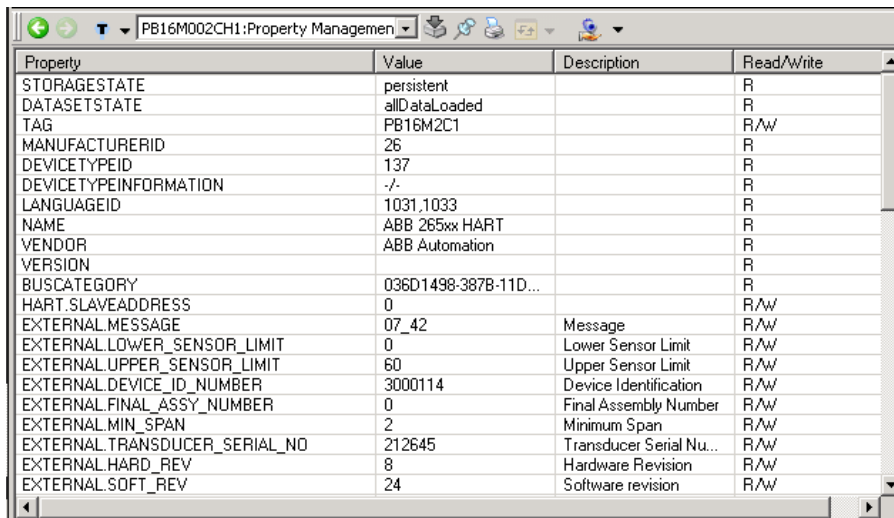


The 800xA Service User cannot access the private dialog of DTM though the private dialog functionality is enabled.

Setting this object to **Communication disabled/enabled** mode is described in *System 800xA Configuration (3BDS011222*)*.

Property Management Aspect

This aspect lists the DTM properties of the selected device type object.



Property	Value	Description	Read/Write
STORAGESTATE	persistent		R
DATASETSTATE	allDataLoaded		R
TAG	PB16M2C1		R/W
MANUFACTURERID	26		R
DEVICETYPEID	137		R
DEVICETYPEINFORMATION	-/-		R
LANGUAGEID	1031,1033		R
NAME	ABB 265xx HART		R
VENDOR	ABB Automation		R
VERSION			R
BUSCATEGORY	036D1498-387B-11D...		R
HART_SLAVEADDRESS	0		R/W
EXTERNAL.MESSAGE	07_42	Message	R/W
EXTERNAL.LOWER_SENSOR_LIMIT	0	Lower Sensor Limit	R/W
EXTERNAL.UPPER_SENSOR_LIMIT	60	Upper Sensor Limit	R/W
EXTERNAL.DEVICE_ID_NUMBER	3000114	Device Identification	R/W
EXTERNAL.FINAL_ASSY_NUMBER	0	Final Assembly Number	R/W
EXTERNAL.MIN_SPAN	2	Minimum Span	R/W
EXTERNAL.TRANSDUCER_SERIAL_NO	212645	Transducer Serial Nu...	R/W
EXTERNAL.HARD_REV	8	Hardware Revision	R/W
EXTERNAL.SOFT_REV	24	Software revision	R/W

Figure 23. Property Management Aspect Window



The Property Management aspect is required for bulk data operations through Bulk Data Manager. Drag and drop this aspect to the bulk data sheet to get all listed parameters available for configuration.

For more information on Bulk Data Manager, refer to *System 800xA Engineering 5.1 Engineering Studio (3BDS011223*)*.



DTMs may not support all the parameters visible in **Property Management** aspect for writing through BDM. For example, all the HART devices may support following parameters for writing through BDM:

- Upper and lower range values.
- Primary variable units.
- Tag, descriptor, and message.

It may not be possible to write all other parameters through BDM.

PROFIBUS Management Aspect

The CI854(A) PROFIBUS Communication Interface provides a Web-Server, which can be used for commissioning or for service purpose in case of any fieldbus communication issues.

The Web Interface is accessible through a standard web browser like Microsoft Internet Explorer or Netscape Navigator as well as the PROFIBUS Management aspect, accessible through the **AC 800M Controller** object.



The Fieldbus Builder PROFIBUS/HART add automatically a new **PROFIBUS Management** aspect to the controller object when the operating mode is set to **Communication enabled** at first time.

To start the Web Interface enter the IP address of the controller in the address bar of the Web-Browser and press enter or select the PROFIBUS Management aspect.

For safety reason a login user and password is required to access the web server view of CI854. After successful login the following view is visible:

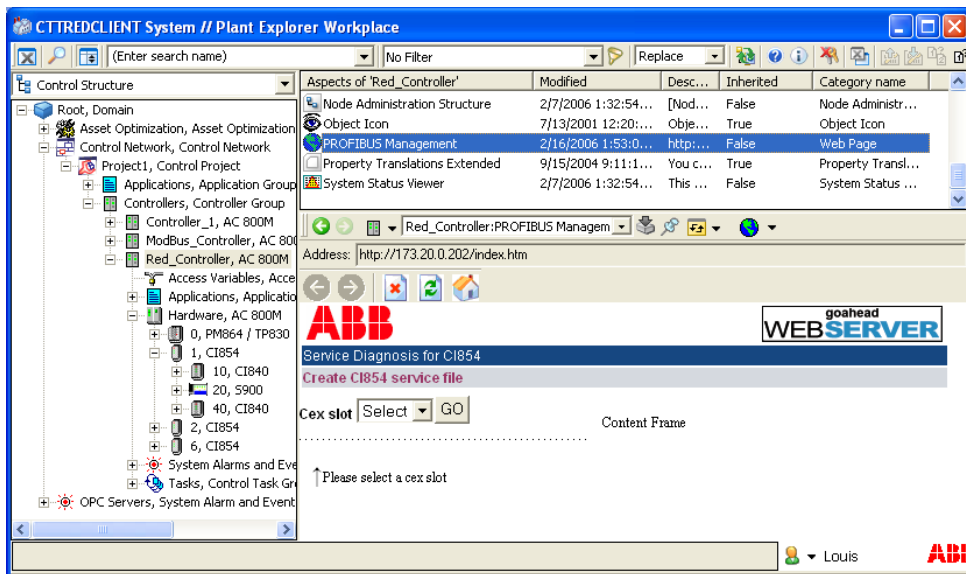


Figure 24. CI854 Web Server through PROFIBUS Management Aspect

Web Server functionality

The Web Server starts as default window with Service Diagnosis for CI854. The pull down menu of the CEX Slot list the connected CI854/CI854A modules. Select the required slot number to operate the diagnosis. Confirm the selection with **Go** button. The following list of actions may be required for Device Management PROFIBUS and HART commissioning and can be performed for the selected CEX-Slot Module (the list shows only a reduced subset of functions):

- **SetAddress**
Use this service to change the address of a connected PROFIBUS slave device.
- **LiveList**
Use this service to see which devices are connected to the PROFIBUS.
- **CycleTime**
Use this service to read the actual measured cycle time for the running PROFIBUS.
- **GeneralStatus**
Use this service to get a general overview about the running PROFIBUS.
- **MasterSettings**
- Use this service to see which settings are actual loaded in the CI854/CI854A PROFIBUS master unit.
- **SlaveDiagnosis**
- Use this service to see which diagnostics are currently present in the slave unit.
- **SlaveConfig**
- Use this service to get the actual loaded configuration data.
- **Slave-I/O** Use this service to read the input and output data for a specific slave unit.



The Web Server is described in detail in the related CI854 product documentation *AC 800M PROFIBUS DP Configuration (3BDS009030*)* manual.

FBF FileSync Helper Aspect

This aspect is available from 800xA system version 5.0 onwards in *Control Structure* of Plant Explorer at the Root Object.

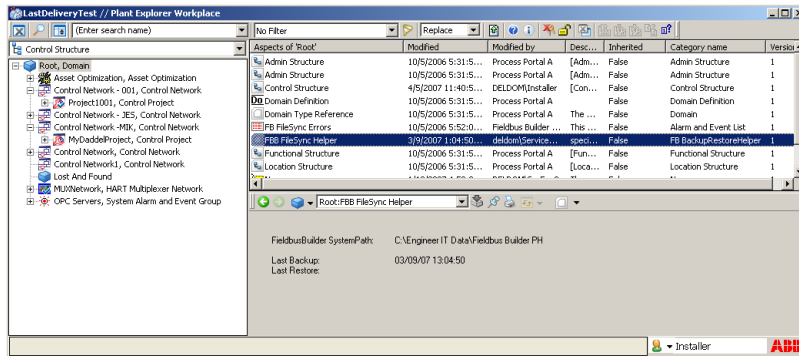


Figure 25. FBF FileSync Helper Aspect at the Root Object

FBF FileSync Helper displays the time of the last System Backup and/or Restore, which have been performed through 800xA's Configuration Wizard.

If a system restore from a system version less than 5.0 (for example, 800xA 4.1) have been done, which shall be restored in a system version 5.0 (or higher), the aspect synchronizes the data set of the shared directory *Fieldbus Builder PH* with the Aspect Directory on the aspect server.



The aspect and the aspect view does not require any configuration and is for information only.

In addition to the *FBF FileSync Helper* aspect there could be an aspect called *FB FileSync Errors*, which is introduced in system version 5.0 only. This aspect is for internal use only. It displays information, if a synchronization of the shared folder failed during system restore.

Reservation of Aspects

The following examples shows the relations between:

- Reservation and changes of the Device Management aspect.
- Reservation and changes of the Fieldbus Management aspect.
- Release reservation and Device Management aspect, Fieldbus Management aspect and the communication mode.

Changes in Device Management Aspect

Use case: Change DTM parameters in the Device Management aspect view.

- The **Device Management** view is selected, but the device type object is not reserved.
 - The DTM view will be opened in read-only mode (or the DTM will not open any DTM views).
- The **Device Management** view is selected and the device type object is reserved.
 - The DTM view has to be reopened to refresh the DTM view (if applicable).
 - The DTM view will be opened with full read-write access (depending on the system user role). Other user in the system get only read access to the Device Management aspect under the currently reserved entity.
 - In case of changes in the DTM the version of selected aspect will be increased.

Changes in Fieldbus Management Aspect

Use case: Change channel assignment in the Fieldbus Management aspect view.

- The **Fieldbus Management** view is selected, but the device type object is not reserved. Channel assignment by dragging and dropping modules to corresponding channels shall be performed.
 - If the device type object is not reserved, the new assignment will be rejected. The modules remain unassigned or old assignment is kept.
- The **Fieldbus Management** view is selected and the device type object is reserved. Channel assignment by dragging and dropping modules to corresponding channels shall be performed.
 - Channel assignment by dragging and dropping modules to corresponding channels will be successfully accomplished.

Release Reservation

Use case: Changes have been performed in the topology tree and the device type object (or projects) shall be released.

- All open Device Management aspect views in system will be closed after release. If changed DTM data have not been saved yet, the user gets prompted to save the DTM data set.

All open Fieldbus Management aspects in system will be set disable communication mode.



800xA multi-node as well as single node systems is supported by the Fieldbus Builder PROFIBUS/HART and the DTMs. The following issue shall be considered for a multi-node system:

- DTM supports multi-user access, which allows one user only write access to the device data set. If another user has DTM access to the same device at the same point of time, only read access to the device data is allowed.
- If the same user is logged in to different PCs of the same system, he will get on all PCs write-access, because the DTM is locked by his user name, which is used in parallel on different PC's.

Section 3 OPC Server PROFIBUS/HART

The information in this section provides a general description of the OPC Server PROFIBUS/HART. Refer to *System 800xA Configuration (3BDS011222*)*, for more information on the standard configuration workflow of this tool is described.

Overview

OPC is an abbreviation for OLE for Process Control. OLE for Process Control is an open interface standard, which is based on the OLE (Object Linking and Embedding) Windows-based technology, COM (Component Object Model) and DCOM (Distributed Component Object Model), and enables simple, standardized data exchanged between applications in industrial environments and both the office world and the world of production and manufacturing.

The OPC Server PROFIBUS/HART provides data from PROFIBUS and HART field devices to 800xA system applications such as Asset Optimizer Server, if the device type objects are prepared for OPC access. In connection with Asset Monitors, the OPC Server PROFIBUS/HART is used to access specific field device data, device status, and diagnostic data to make necessary informed maintenance decisions.

- Every value acquired through OPC has a time stamp and a status.
- OPC allows system applications to specify required scan rates (depends on the speed of the data communication through the 800xA system).
- An OPC client can be used to monitor and select variables on a server.
- The concept of creating groups permits a variety of sets of variables with different scan rates.

The interfaces feature all the functions designated as "required" in the OPC specifications. The browser interface was also added. An external client can use these functions to read out the list of variables known to an OPC Server PROFIBUS/HART.

The OPC specification describes different methods for accessing and distributing data between OPC clients and servers.

The OPC Server PROFIBUS/HART is purely a data access server, as HART does not support, for example, alarms and events. PROFIBUS alarms and events are part of the cyclic communication layer and are therefore evaluated by the AC 800M Controller OPC Server.



Due to the nature of the HART protocol and the necessary routing through the system, HART device data may not be updated immediately after starting read/write access.

System Structure

The OPC Server PROFIBUS/HART has been designed specifically for the System 800xA. The OPC Server is configured from the Fieldbus Builder PROFIBUS/HART and provides field device data to the system.

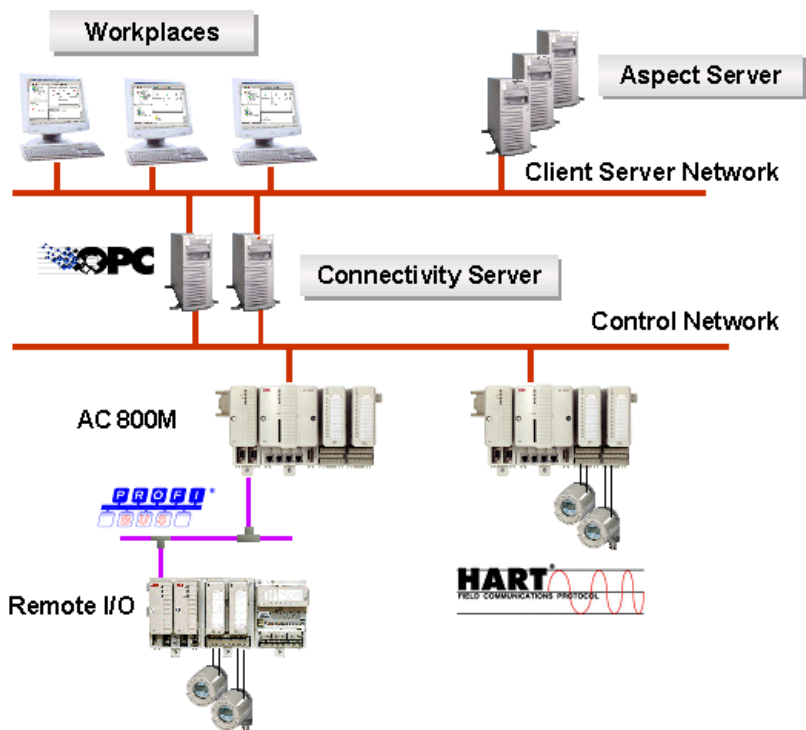


Figure 26. System Structure

The OPC Server is installed on the Connectivity Server in the System 800xA.

OPC Server PROFIBUS/HART Aspects



Of the aspects that are valid both for the Fieldbus Builder PROFIBUS/HART and for the OPC Server PROFIBUS/HART, only those relevant to OPC will be described in this section.

Unless described in more detail, settings for the aspects described here may be modified by ABB Service only.

Aspect overview

The following aspects are required for the operation of the OPC Server PROFIBUS/HART:

Table 7. OPC Server PROFIBUS/HART Aspects

Aspect	Function
Device Definition	This aspect can be used to assign an installed OPC DTM to a specific object in the <i>Object Type Structure</i> .
Fieldbus Management	This aspect contains the "Configure OPC Server" menu item, which initiates the transfer of the fieldbus topology to the OPC Server.
Control Connection	Displays the OPC items available for a certain field device.
FBB-OPC Data Source Definition	Configures the OPC connectivity to a certain Fieldbus OPC Server. The OPC Server is normally located on a Connectivity Server of the 800xA system. Redundant Connectivity Server are also configured through this aspect.
FBB-OPC Configuration	This aspect provides the user interface to the OPC Server configuration data such as path settings, cycle time, etc., and allows diagnosis and service in case of OPC communication issues.

Aspects in the Object Type Structure

The *Object Type Structure* contains aspects used for OPC communication on instantiated device type objects.

To establish an OPC connection with a field device, a specific DTM, which supplies data to the OPC Server, must be integrated on the device type object. ABB basic DTMs (Basic HART DTM, Basic PROFIBUS DTM), which are installed with the Device Management PROFIBUS and HART package, can for example set up this OPC access.

The following aspects must be available on the device type object for OPC access:

- **Device Definition** aspect
This aspect assigns an OPC DTM to the device object.

Device Definition

The **Device Definition** aspect is used to assign an OPC DTM to a specific device type object in the *Object Type Structure*. Four tabs can be accessed when the aspect on the device object is opened. The **OPC Settings** tab is for an additional

assignment of an OPC DTM to a field device object in order to make device data available to higher-level applications through OPC access.

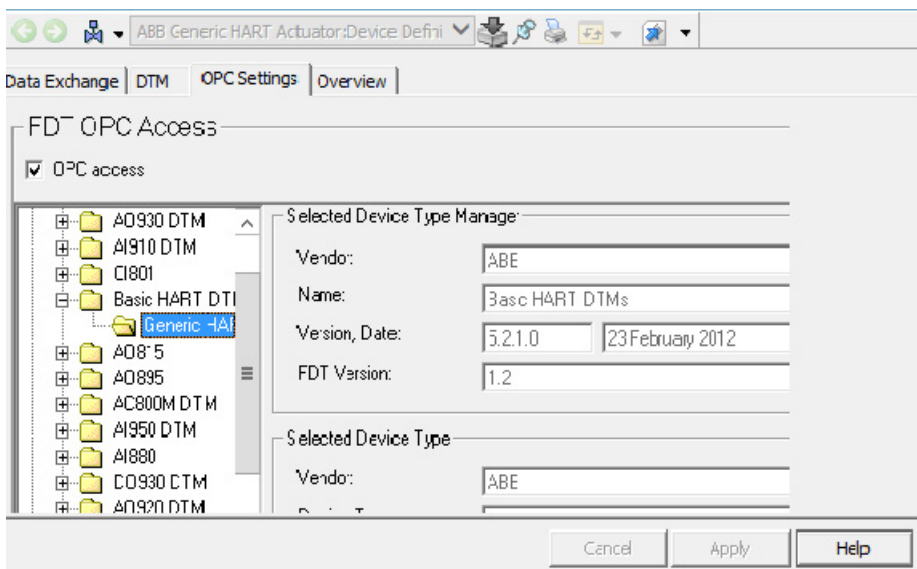


Figure 27. OPC Access Settings

Aspects in the Control Structure

OPC Server communication with each workstation and with the field devices is configured and assigned in the *Control Structure*.

The following aspects are required for this purpose:

- **FBB-OPC Server Data Source Definition**
Defines the PC on which the OPC Server is to run.
- **FBB-OPC Configuration**
Offers a user interface for detailed OPC Server timing, diagnostics and statistics.
- **Fieldbus Management**
Creates the fieldbus topology required by the OPC Server for device access.
- **Control Connection**
Used to establish an OPC connection to a device for test purposes.

FBB-OPC Data Source Definition Aspect

This aspect is used to define the OPC Server PC supplying the data for the OPC clients. The aspect is automatically added to each control network in the *Control Structure* of the Plant Explorer when the Device Management is installed on the 800xA system.



Refer to *System 800xA Configuration (3BDS011222*)*, for more information on the configuration of the **FBB-OPC Data Source Definition** aspect.

FBB-OPC Configuration Aspect

FBB-OPC Configuration aspect containing information for statistics, audit trail events, configuration and OPC diagnostics.

After selection of **FBB-OPC Configuration** aspect the OPC Timing Statistics tab is appearing as default.

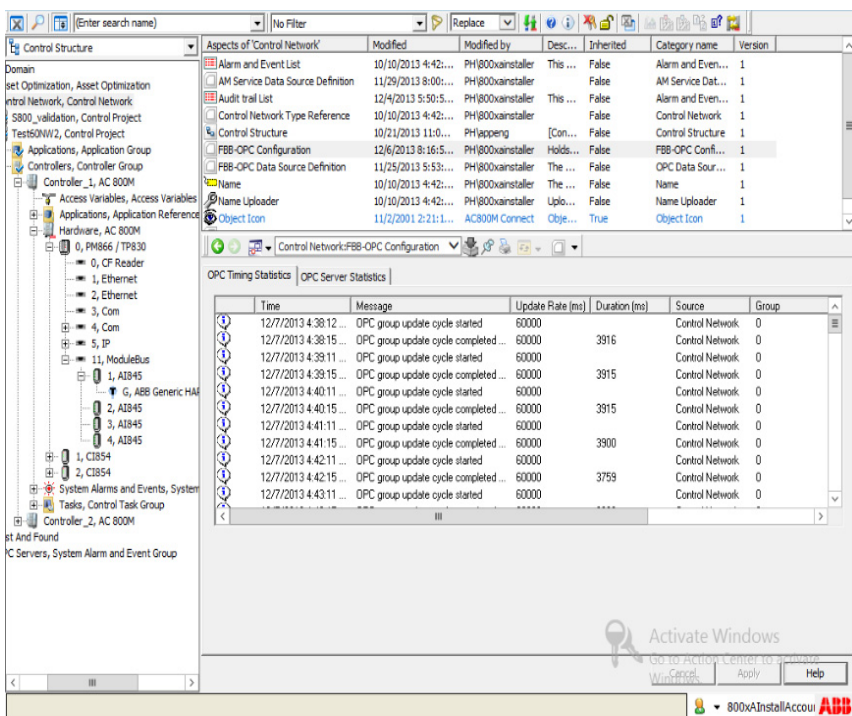


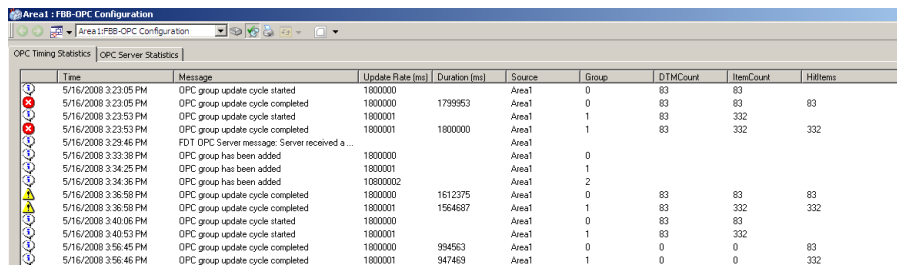
Figure 28. FBB-OPC Configuration Aspect in the Control Structure

Once the FBB-OPC Configuration aspect has been selected, an OPC Server Configuration window appears containing the following tabs:

- **OPC Timing Statistics**
This is the start-up tab with statistic information of started OPC Client groups belonging to the particular OPC server. Timing parameter will be displayed to optimize the OPC server Cycle Time.

- **OPC Server Statistics**
This tab card provides Audit Trail information, if changes in the configuration or status have been performed. Furthermore it provides statistics information, for example, how many HART or PROFIBUS devices have been configured.

OPC Timing Statistics Tab



Time	Message	Update Rate (ms)	Duration (ms)	Source	Group	DTMCout	ItemCount	HItems
5/16/2008 3:23:05 PM	OPC group update cycle started	1800000		Area1	0	83	83	
5/16/2008 3:23:05 PM	OPC group update cycle completed	1800000	1739953	Area1	0	83	83	83
5/16/2008 3:23:53 PM	OPC group update cycle started	1800001		Area1	1	83	332	
5/16/2008 3:23:53 PM	OPC group update cycle completed	1800001	1800000	Area1	1	83	332	332
5/16/2008 3:29:45 PM	FD1 OPC Server message: Server received a ...			Area1				
5/16/2008 3:33:38 PM	OPC group has been added	1800000		Area1	0			
5/16/2008 3:34:25 PM	OPC group has been added	1800001		Area1	1			
5/16/2008 3:34:36 PM	OPC group has been added	10800002		Area1	2			
5/16/2008 3:36:59 PM	OPC group update cycle completed	1800000	1612375	Area1	0	83	83	83
5/16/2008 3:36:59 PM	OPC group update cycle completed	1800001	1564887	Area1	1	83	332	332
5/16/2008 3:40:08 PM	OPC group update cycle started	1800000		Area1	0	83	83	
5/16/2008 3:40:53 PM	OPC group update cycle started	1800001		Area1	1	83	332	
5/16/2008 3:56:45 PM	OPC group update cycle completed	1800000	994563	Area1	0	0	0	83
5/16/2008 3:56:46 PM	OPC group update cycle completed	1800001	947489	Area1	1	0	0	332

Figure 29. OPC Timing Statistics Window

The **OPC Timing Statistics** tab lists all OPC Client Groups connected to the OPC Server PROFIBUS/HART, for example, Control Connections or Asset Monitors with its cycle times.

The list includes to the currently available OPC Client Groups also history data of previous connected OPC Client Groups.



Statistics information is necessary to optimize the cycle time of the server. The cycle time varies according to the number of connected devices. By default, the cycle time is configured to a fixed value. Alter the value in the Statistics tab according to the measured duration time. Cycle time is directly proportional to the number of Asset Optimization servers connected to the system.

Each OPC Client subscribing for OPC items are displayed as new OPC Client group.

The list separates the statistics information in the following different columns:

- **Status Icon**
This column shows the current status of an OPC Group.

- Time
This column shows the exact time stamp, when the event occurred.
- Message
The Message column shows the details of the occurred event. The following information may be visible, depending on the event:
 - Add/Remove entries
If a new OPC Client Group is started, for example, by using the **Control Connection** aspect, a new OPC Client Group is displayed with the comment “Added” in the list.
The entry “Removed” will be shown, if the OPC Client group stops subscribing for OPC items.
 - Start/Complete OPC Group Cycle
If an OPC GROUP Cycle is started or completed is shown in this column.
- UpdateTime (ms)
Update time is the configured (fixed) cycle time (ms) for the OPC Client Group. For Asset Monitoring this time is configured in the following aspects in the *Control Structure* of the Plant Explorer at the Asset Optimization Node:
 - DIP HART Asset Monitor Data Source
This aspect defines the cycle time to read the HART Status Byte (Standard Diagnostics)
 - DIP HART Asset Monitor Data Source2
This aspect is not used by the OPC Server PROFIBUS/HART
 - DIP HART Asset Monitor Data Source3
This aspect defines the cycle time to read all additional HART device information
 - DIP PROFIBUS Asset Monitor Data Source
This aspect is the common time for all PROFIBUS device data.

The pre-configured update time can be optimized according the real time value included in the “Duration” entry.

Recommendation by rule:

Information icon:

The update time does not require an adaptation. Tuning is possible to speed up the cycle time. Set the configured value to 150% of the visible Duration Time.

Warning icon:

The update time shall be increased. Set the configured value to 150% of the visible Update Time.

Error icon:

The OPC cycle is not finished in the configured time. The update time must be increased. Set the configured value to 200% of the visible Update Time.



Control connection aspect may not show reliable OPC data until OPC Server PROFIBUS/HART is in steady state. Allow at least one complete OPC cycle for OPC Server to reach steady state.

PROFIBUS / HART asset monitor and **Control Connection** aspects are supported with valid data, if the OPC Server PROFIBUS/HART has finished the first read cycle successfully (indicated by a information icon or warning icon). Do not open **Control Connection** aspects, till error icons disappear.

- **Duration (ms)**
Duration shows the time (ms), which the OPC Client Group needs to read all configured OPC items in one cycle. Is the time close to the value of the column *UpdateTime*, the cycle may not be finished. In this case the configured time as described in *UpdateTime* needs to be increased.
- **Source**
The source column shows the node in the *Control Structure*, which contains the OPC Server configuration and to which the OPC Client Group belongs to. The OPC Server is configured in the **FBB-Data Source Definition** aspect.
- **Group**
The column shows the number of currently running OPC Groups.

Example:

If one user opens a **Control Connection** aspect on a system node, a new OPC

Group (number) will be established, even if another user already has opened a control connection on the same object on a different node.

- **DTMCount**
DTM Count shows the number of involved DTM used by the OPC Client Group to access OPC Items.
- **ItemCount**
Item Count shows the total number of OPC items accessed by the OPC Client Group.

OPC Server Statistics Tab

Time	Message	HART Devices	PROFIBUS Devices	Source
11/18/2013 12:41:0...	OPC configuration was loaded	13	6	Control Network
11/18/2013 12:41:0...	OPC Server is starting			Control Network
11/18/2013 12:41:0...	OPC Server was successfully started			Control Network
11/18/2013 6:57:31 ...	OPC configuration was loaded	11	6	Control Network
11/18/2013 6:57:31 ...	OPC Server is starting			Control Network
11/18/2013 6:57:31 ...	OPC Server was successfully started			Control Network
11/25/2013 3:13:11 ...	OPC configuration was loaded	14	5	Control Network
11/25/2013 3:13:13 ...	OPC configuration was loaded	14	5	Control Network
11/25/2013 3:13:13 ...	OPC Server is starting			Control Network
11/25/2013 3:13:13 ...	OPC Server was successfully started			Control Network
11/25/2013 3:18:03 ...	OPC configuration was loaded	14	5	Control Network
11/25/2013 3:18:03 ...	OPC Server is starting			Control Network
11/25/2013 3:18:03 ...	OPC Server was successfully started			Control Network
11/25/2013 3:23:19 ...	OPC configuration was loaded	14	5	Control Network
11/25/2013 3:23:19 ...	OPC Server is starting			Control Network
11/25/2013 3:23:19 ...	OPC Server was successfully started			Control Network
11/25/2013 6:04:12 ...	OPC configuration was loaded	14	5	Control Network
11/25/2013 6:04:12 ...	OPC Server is starting			Control Network
11/25/2013 6:04:12 ...	OPC Server was successfully started			Control Network
11/25/2013 7:43:20 ...	OPC configuration was loaded	14	5	Control Network
11/25/2013 7:43:20 ...	OPC Server is starting			Control Network
11/25/2013 7:43:20 ...	OPC Server was successfully started			Control Network

Figure 30. OPC Server Statistics Tab

The **OPC Server Statistics** tab can be used to get the total number of used device types and the current status of the OPC Server PROFIBUS/HART. Depending on the number of configured devices for OPC access, the cycle time of the OPC Group listed in the **OPC Timing Statistics** Tab needs to be adapted. The cycle time depends mainly on the configured devices in the topology using OPC connections to the OPC Server. The cycle time may be set to new values pre-configured in the system.

Furthermore this tab provides an overview of activities performed on a particular OPC Server PROFIBUS/HART. the following event information is shown in the list:

- Time
This column shows the exact time stamp, when the audit trail event occurred.
- Message
The Message column shows the details of the occurred event. Currently the following information may be visible, depending on the event:
 - OPC Server is starting
After OPC topology creation through **Fieldbus Management** aspect the topology is stored in a configuration file used by the OPC Server. During load of this file this event is shown.
 - OPC Server was successfully started
This message informs about a started and running OPC server. The time, when the server is changed in the **Run** state can be seen in the Time column.
 - OPC Server is stopping
This event shows, that a server changes next to the **Stop** state.
 - OPC Server Stopped
The server is in the **Stop** state and cannot offer OPC access to device data.
 - OPC Configuration loaded
The OPC Server got a new configuration file created by “Configure OPC Server” in the **Fieldbus Management** aspect.
- HART Devices
If the OPC Server is configured through **Fieldbus Management** aspect, the HART devices in the topology providing OPC items to the OPC Server are counted. HART devices without related OPC items are not counted. Based on this information the user can compare this against the released system support. The configured OPC Server may be split in sub-structures to reach system limitation.

- **PROFIBUS Devices**
If the OPC Server is configured through **Fieldbus Management** aspect, the PROFIBUS devices in the topology providing OPC items to the OPC Server are counted. PROFIBUS devices without related OPC items are not counted. Based on this information the user can compare this against the released system support. The configured OPC Server may be split in sub-structures to reach system limitation.
- **Source**
The source column shows the node in the *Control Structure*, which contains the OPC Server configuration and to which the OPC Client Group belongs to. The OPC Server is configured in the **FBB-Data Source Definition** aspect.

Fieldbus Management Aspect

This aspect supplies the current fieldbus topology to the OPC Server PROFIBUS/HART for data access. If changes are made to the topology by the user, the OPC Server must be configured using this aspect. Refer to [Section 2, Fieldbus Builder PROFIBUS/HART](#) for more information on the **Fieldbus Management** aspect.

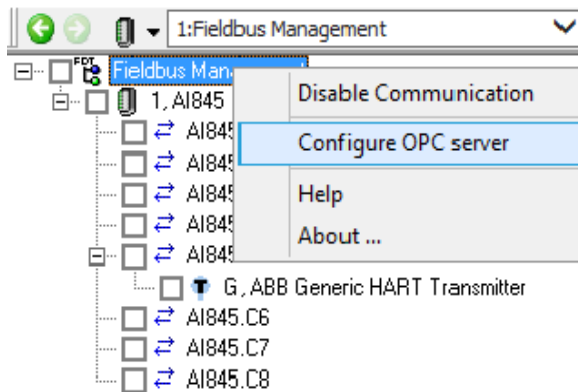


Figure 31. Configuring the OPC Server in the Fieldbus Management tree



It is mandatory to reserve the complete Control/Multiplexer network including underlying projects and controller. In addition during OPC Server PROFIBUS/HART configuration it is recommended to close all open **Control Connection** aspects at field device instances.



After a change in the fieldbus topology for PROFIBUS and HART the OPC configuration may be adjusted to get a valid configuration. The communication between OPC Server PROFIBUS/HART and the devices is interrupted only after the configuration is finished. All OPC connections to the OPC Server PROFIBUS/HART are closed and re-established again in the next call up of the Asset Optimization Server. During the configuration all OPC connections persist.

Control Connection Aspect

The **Control Connection** aspect indicates that the OPC items configured for the device currently selected. The **Control Connection** aspect can be used to test the OPC connection as the OPC items feature a quality status.



Refer to [Testing the OPC connection](#) on page 99 for more information.

Splitting OPC Server Configuration

In order to make the data from a field device available to other system applications, an OPC Server for field devices must be configured in the 800xA system project. An OPC Server PROFIBUS/HART resource is entered and subsequently configured in the *Control Structure* of the Plant Explorer.

After completing the engineering work for HART and PROFIBUS devices in the 800xA system, the OPC Server PROFIBUS/HART can be configured. Depending on the number of devices and its device data accessed by the OPC Server special post-configurations might be required.



Refer to *System 800xA Configuration (3BDS011222*)* for more information on the standard configuration of the OPC Server PROFIBUS/HART.

If the limit of devices released for OPC access exceeds, then perform the following steps:

Pre-settings

Perform the following steps for correct configuration of the OPC Server:

- Installed the Device Management PROFIBUS and HART on the 800xA system nodes.
- Control Network or Multiplexer Network is now created.
- Assigned the OPC Server to a Connectivity Server in the system.
- If applicable, enabled the Tool Routing for AC 800M Controller.
- Fieldbus topology is now created.
- If applicable, stop the Asset Optimization Server.

OPC Server PROFIBUS/HART Configuration Splitting

If the *Fieldbus Structure* below a Control Network Object includes more devices than supported by the OPC Server (Refer to *System 800xA System Guide Technical Data (3BSE041434*)*), for information on OPC Server limitation, then the **OPC** aspects can be moved to underlying objects. This offers the opportunity to increase the device support for OPC access over the limit as described in the Release Notes.



Increasing the number of devices requires more Connectivity Server to run additional OPC Server PROFIBUS/HART. It is only allowed to run one OPC Server PROFIBUS/HART on a single Connectivity Server.

For Example:

If the OPC Server PROFIBUS/HART is configured on the Control Network Object, then the complete sub-structures (containing all underlying controller and field devices) should not exceed the limit of supported devices of the OPC Server. If the number of supported devices is reached, then an additional OPC Server must be configured on sub-structures to distribute OPC load to additional Server. In this

example the **OPC Server** aspects are moved from the Control Network Object to all Controller Nodes, which are configured in the certain Control network.

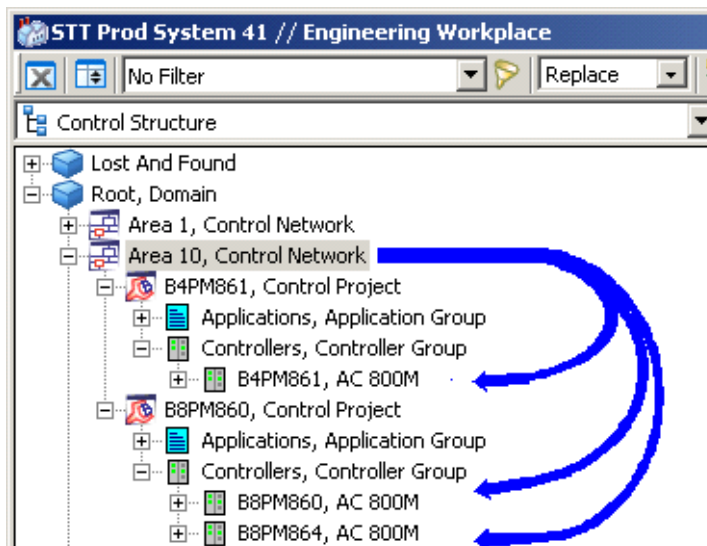


Figure 32. Example Application



OPC Server aspects can be moved to sub-nodes. All sub-nodes on the same level below the Control Network Object must be re-configured with the **OPC Server** aspects.



Each sub-node in the *Control Structure* re-configured with **OPC Server** aspects, requires its own OPC Connectivity Server. 800xA system limitation regarding OPC Connectivity Server must be considered before performing the steps described in this sub-section.

In the example the Control Network Object includes 3 different AC 800M controller to which the **OPC Server** aspects shall be moved. Therefore 3 independent Connectivity Server for the OPC Server PROFIBUS/HART are mandatory to work with this application.

If only 2 Connectivity server for the OPC Server are available the configuration must be done on nodes placed on a higher level, for example, Control Project Nodes.

If the connected devices in 800xA system is exceeding the supported limit, then perform the following steps for the relevant OPC Server PROFIBUS/HART:

1. The AC 800M OPC Server shall be configured on the Control Network Object in the *Control Structure* of the Plant Explorer, if applicable (refer to *System 800xA Configuration (3BDS011222*)*).

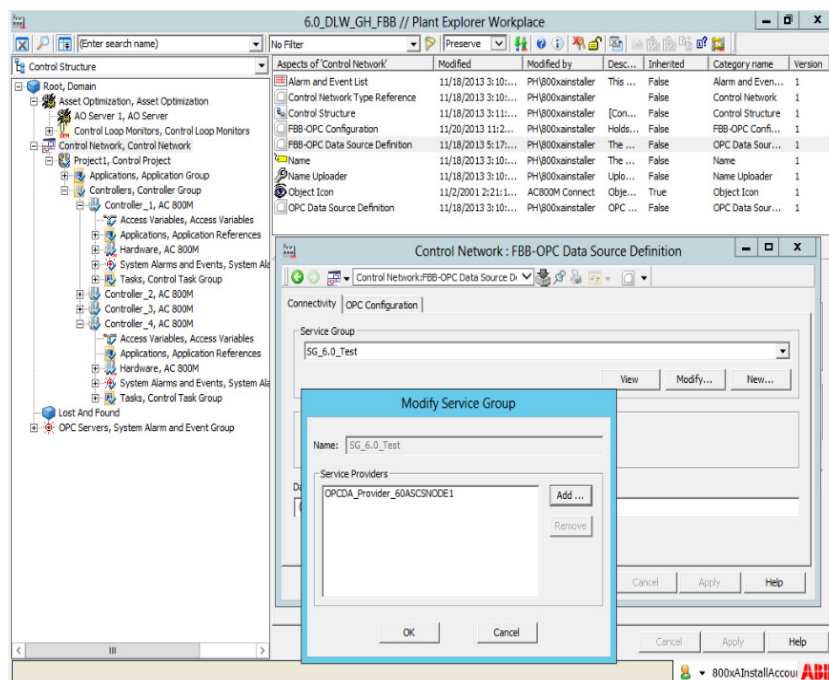


Figure 33. Configured AC 800M OPC Server

2. The Asset Optimization Server shall be configured in the Plant Explorer. If the Asset Server is configured, then a **AM Service Data Source Definition** aspect is created on the Control Network Object in the *Control Structure* of the Plant Explorer (see Asset Optimization product documentation for more details).

3. If the OPC Server was already configured, the delete the OPC Server PROFIBUS/HART configuration,. In the case, that configuration of an OPC Server PROFIBUS/HART was not performed before, proceed with [Step 5](#).
 - Open *Control Structure* in the Plant Explorer and select the Control Network.
 - Select the **FBB-OPC Data Source Definition** aspect in the Aspect window.
 - Switch to the Configuration view of this aspect.

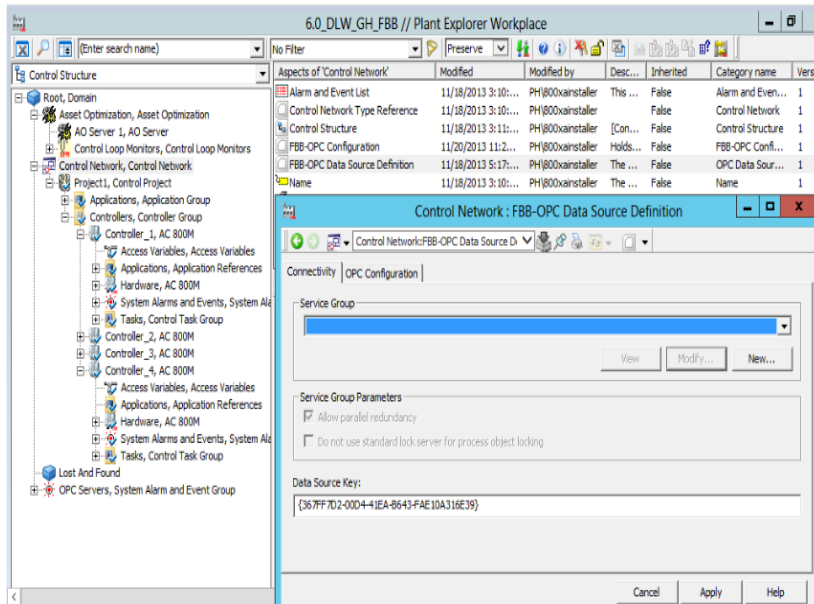


Figure 34. Config view of the FBB-OPC Data Source Definition aspect

- Choose an empty entry from the selection box in the Connectivity tab.

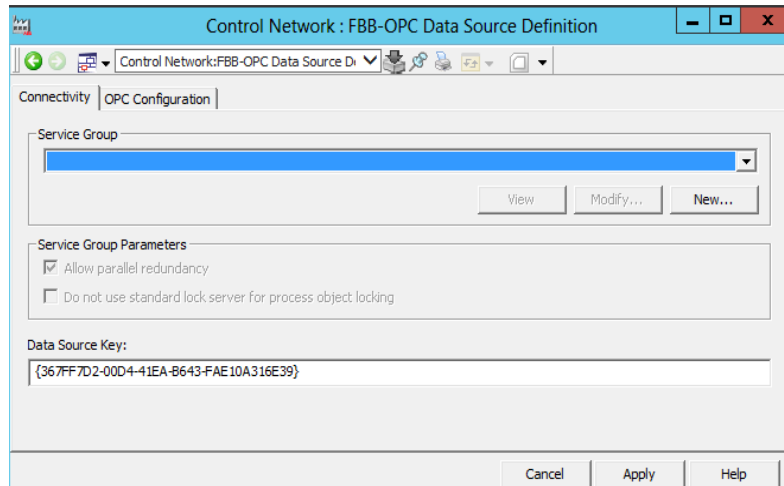


Figure 35. Empty FBB-OPC Data Source Definition aspect

- Confirm the changes with **Apply**.
- Switch to *Plant Explorers Service Structure* and expand the tree structure to:
Service Structure -> OpcDA Connectors -> [Service group, name of the group was given before during configuration]
- Disable the service of the OPC Server PROFIBUS/HART inside the corresponding service group for the Control Network. The service is in an **uncertain** state.
- Right-click and select the OPC Service group.
- Delete the OPC Service group, which covers the configured OPC Server PROFIBUS/HART of the certain Control Network, from the *Service Structure*.

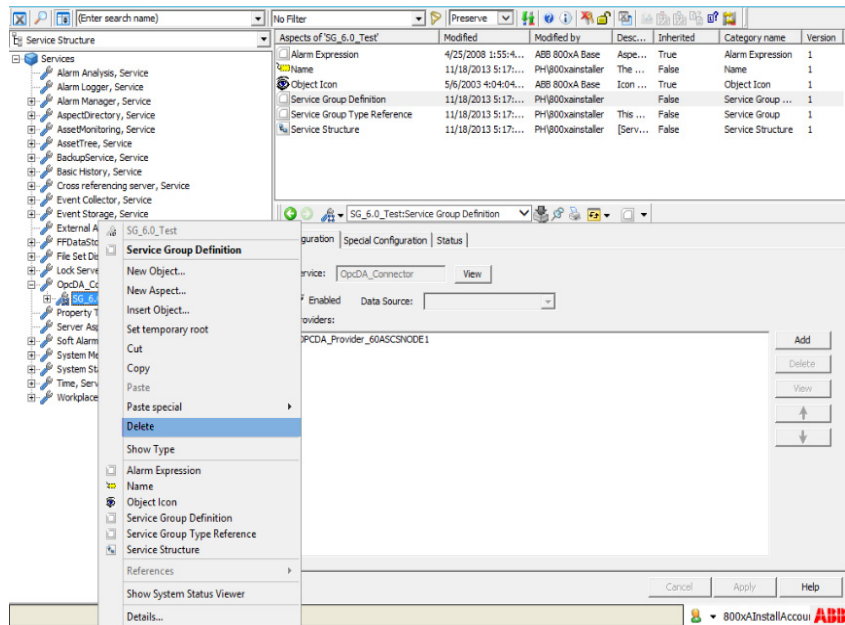


Figure 36. Delete OPC service group

- The Asset Optimization Server must be stopped before proceeding with the next steps. Navigate to *Service Structure* and stop Asset Optimization service.
- Go to the *Control Structure* in the Plant Explorer and select the Control Network Object, which shall be configured.

Perform **Step 6 to Step 10** with the following aspects at the Control Network Object, if applicable:

- AM Service Data Source Definition
- OPC Data Source Definition
- FBB-OPC Configuration
- FBB-OPC Data Source Definition

- Select one of the aspect listed above.

7. Right-click the mouse and select **Copy**.

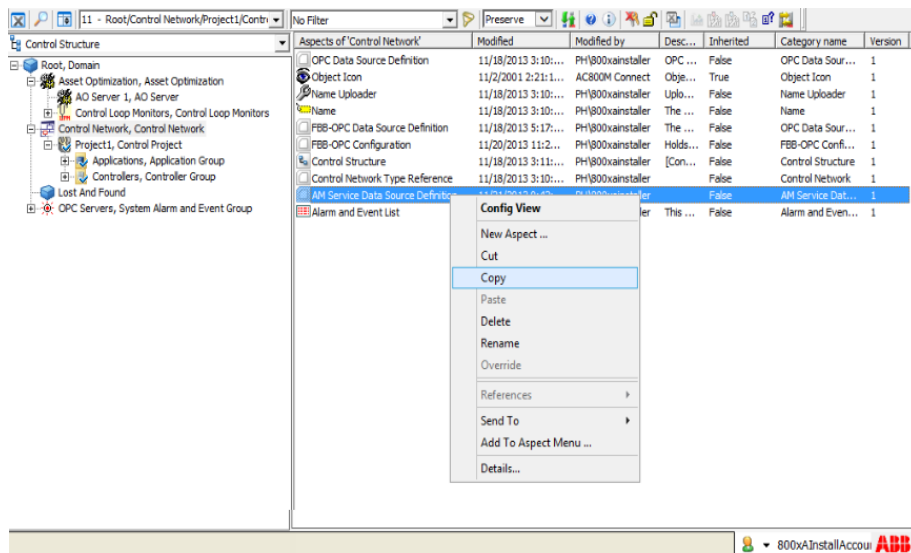


Figure 37. Copy AM Service Data Source Definition aspect

8. Select the dedicated sub-node (for example. Controller Project Node).
9. Click in the Aspect Window by right-clicking the mouse and select **Paste**.
10. Repeat [Step 8](#) to [Step 9](#) on all other sub-node placed on the same tree level.
11. Configure the copied **FBB-OPC Data Source Definition** aspect on all sub-nodes.
 - Go to the *Control Structure* in the Plant Explorer and select the sub-node, where the aspects have been copied.
 - Select the **FBB-OPC Data Source Definition** aspect.
 - Select the Connectivity tab.
 - Click **New**.
 - Change the name of the service group to a unique identifier.
 - Click **Add**.

- Select the Connectivity Server on which the OPC Server PROFIBUS/HART is installed and running.
- Click **OK** in the main window to finish OPC Server configuration.



If redundant Connectivity Servers are used in the system, then they need to be assigned to the same sub-node. To do this, repeat [Step 11](#) for each redundant Connectivity Server.



The original **FBB-OPC Data Source Definition** aspect on the Control Network Object must not be configured and assigned to an OPC Server.

12. Create a new OPC Server configuration and start OPC Server PROFIBUS/HART on each new sub-node in the *Control Structure* of the Plant Explorer.
 - Go to the *Control Structure* in the Plant Explorer and select a device object below the sub-node, where the aspects have been copied.
 - Select the **Fieldbus Management** aspect and open the context menu with right mouse button on the Fieldbus Management Node in the Fieldbus Management tree. Switch to **Communication enabled** mode.
 - Click again with the right mouse button to open the Fieldbus Management context menu. Select **Configure OPC Server**.

Testing the OPC connection

The device specific data provided by the OPC Server can be displayed through the **Control Connection** aspect.



Control connection aspect may not show reliable OPC data until OPC Server PROFIBUS/HART is in steady state. Allow at least one complete OPC cycle for OPC Server to reach steady state. For information, refer to *System 800xA Configuration (3BDS011222*)*.

1. Select a device type object in the *Control Structure* of the Plant Explorer.
2. Select the **Control Connection** aspect.

Name	Data Type	Access	Update Rate	Value	Quality	Timestamp
ADDITIONAL_DEVICE_STATUS	VT_BSTR	R	300000			
DATE	VT_DATE	R/W	300000			
DESCRIPTOR	VT_BSTR	R/W	300000			
DEVICE_ID_NUMBER	VT_UI4	R	300000			
FINAL_ASST_NUMBER	VT_UI4	R/W	300000			
LOWER_RANGE_VALUE	VT_R4	R/W	300000			
LOWER_SENSOR_LIMIT	VT_R4	R	300000			
MESSAGE	VT_BSTR	R/W	300000			
MFR_DEVICE_TYP	VT_UI1	R	300000			
MFR_ID	VT_UI1	R	300000			
MFR_ID_CODE	VT_UI4	R	300000			
PV_PER_RANGE	VT_R4	R	300000			
PV_LIMITS	VT_UI1	R/W	300000			
PVT_LBL_DIST_CODE	VT_UI4	R	300000			
RESPONSE_BYTE0	VT_UI1	R	300000			
RESPONSE_BYTE1	VT_UI1	R	300000			
RESPONSE_COM	VT_UI1	R	300000			
TAG	VT_BSTR	R/W	300000			
TRANS_SPEC_REV	VT_UI1	R	300000			
TRANSUICFR_SFRIAL_INF	VT_UI4	R/W	300000			

Figure 38. Control Connection aspect



The OPC items displayed have been defined for the Asset Monitors. OPC items for device types installed through Device Library Wizard are defined by the Device Integration Center (DIC).

3. Select the **Subscribe for live data** check box.

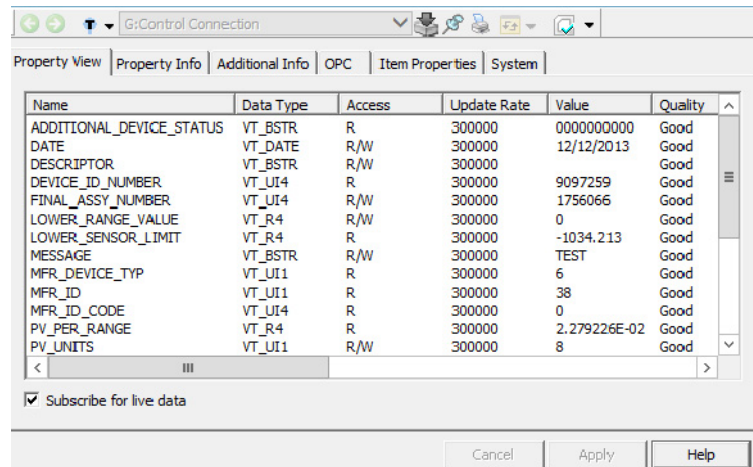


Figure 39. Live data from the field device

All OPC items are updated at a pre-configured update rate.

The following status is shown below the column 'Quality':

- **Good**
The "Good" quality appears if the OPC connection to the device is present. The measured values are being updated at the update rate.
- **Bad**
The OPC Client is not receiving any data from the OPC Server. An online connection to the device is not possible or the configured update rate is too low.
- **Uncertain**
The OPC data is not available in the configured update rate, the last OPC value read is displayed.
If the connection is not re-established, the status will switch to Bad.

In case if "Bad" indicates that an OPC connection refer to [Service and Diagnosis](#) on page 101 for more information.

Service and Diagnosis

If no OPC data is displayed in the **Control Connection** aspect, the OPC connection is faulty. The following checks should be made:

1. Has Device Management PROFIBUS and HART been installed on the system nodes according system installation guideline?
2. Does the 800xA system have a valid license for Device Management PROFIBUS and HART?
3. Has the device type object been integrated into the *Control Structure* correctly (channel assignment, download controller, etc.)?
4. Has the **FBB-Data Source Definition** aspect, which starts the OPC Server, been configured?
5. Has the OPC Server been added to the *Service Structure* of the Plant Explorer correctly? The OPC Server service is entered in the *Service Structure* under **Services -> OPCDA_Connector Service**, under the name configured in the **FBB-OPC Data Source Definition**.
6. Is the OPC Server service **enabled** in the *Service Structure*?
7. Once the **FBB-OPC Data Source Definition** has been configured correctly, the OPC Server must start automatically on the Connectivity Server. Check the OPC Server state in the *Service Structure* of the Plant Explorer workplace.



Only authorized personnel may make changes in the FBB-OPC configuration, as they may affect the operability of the system. Contact ABB Service before making any changes.



When PROFIBUS and HART OPC Server is configured for WirelessHART network or HART Multiplexer network, WirelessHART network and or HART Multiplexer network must be released, before enabling OPC Server service in Service Structure.

8. If the system is setup in different Environments (Production/Engineering), the **Control Connection** aspect is not updated automatically after deploy. Update the OPC Server configuration again (Configure OPC Server through **Fieldbus Management** aspect).

9. Is the OPC Server PROFIBUS/HART in a steady state? Check the Update and Duration Time in the **FBB-OPC Server Configuration** aspect.

Section 4 Device Library Wizard

The information in this section provides a general description of the Device Library Wizard. Refer to *System 800xA Configuration (3BDS011222*)*, for more information on the standard workflow of this tool.

Refer to *System 800xA Device Management Device Library Wizard (2PAA102573*)*, for more information.

Overview

For integration of fieldbus devices from ABB and third party vendors into the System 800xA environment ABB provides single device types. The Device Library Wizard is a tool, used to install and update separately delivered device types into an 800xA system.

Device types are available from System 800xA Media (Installed using Device Library Wizard) or for download from the ABB SolutionsBank.

The Device Library Wizard is an integral part of the Device Management PROFIBUS and HART.

The Device Library Wizard setup consist of the following two components:

- **Device Library Wizard - Client**
The Client program is installed on every 800xA system node and provides the graphical user interface for installation of device types including Aspect Server nodes.
- **Device Library Wizard - Server**
The server program interacts as service on the 800xA Aspect Server nodes and provides history information to the Device Library Wizard - Client. This must be installed only on Aspect Server nodes including Redundant nodes.

Device Library Wizard Main Functionality

The Device Library Wizard offers the following main functionality to manage PROFIBUS and HART device types for 800xA systems:

- **Install Device Types:**
Adds new device types to the 800xA system.
- **Restore Device Types:**
Start re-installation of device types, for example, if the user has manually changed the device type, which needs to be set to the default configuration.
- **Extend Device Types**
Allows to extend installed device types with new features, for example, after loading new system extensions.
- **System Restore Wizard**
Installs missing components after a system restore has been executed, for example, after system upgrade.

The Device Library Wizard is called up through the windows start menu.

Click **ABB Start Menu > ABB Industrial IT 800xA System > Device Mgmt > ABB Device Library Wizard**

Prerequisites

ABB Device Library Wizard – The Client must be installed on each 800xA system node except Thin Client nodes.

ABB Device Library Wizard – The Server must be installed on all 800xA Aspect Server nodes.

The following requirements must be fulfilled to work with the Device Library Wizard:

- All required 800xA licenses are loaded to the License Server and the system has been created and started.
- Device Management PROFIBUS and HART software and system extensions have been installed (refer to *System 800xA Post Installation (2PAA111693*)*).
- The Device Library Wizard Server settings are configured.

- The user has Windows and 800xA system Administrator privileges.

How to use the Device Library Wizard

Refer to *System 800xA Configuration (3BDS011222*)* for a step by step description explaining how to add separately delivered device types into the 800xA system can be found in subsection Device Management and Fieldbuses.



Refer to *System 800xA Device Management Device Library Wizard (2PAA102573*)* for more information on all possibilities of the Device Library Wizard.

Refer to the corresponding release notes from the device type objects, for more information on limitations of the device types

The following is the general workflow to add device types to the 800xA system:

- **Step 1: Obtain Device Types**
Check System 800xA Media for required device types. New device types are available on ABB SolutionsBank for download.
- **Step 2: Extract Device Type Files**
Extract the device type files to the specific Device Integration Library folders on all involved 800xA system nodes using the Device Library Wizard.
- **Step 3: Read Release Notes**
Read the corresponding device type release notes for details and limitations. Release Notes are provided together with the device type file or can be downloaded from ABB SolutionsBank (TechInfoBank). Each device specific release note can be directly access by right mouse click on the listed device type in the Device Library Wizard.
- **Step 4: Install / Restore Device Types**
Add the designated device types to the 800xA system utilizing Device Library Wizard on all involved 800xA system nodes.
- **Step 5: Post-Installation**
Perform the fieldbus protocol specific post-installation actions, if applicable and included in the specific device type or system release notes.

Device Library Wizard in 800xA Object Type Structure

During the installation of a device type, the Device Library Wizard creates a new Object Type Group with the name **DLWData** in *Object Type Structure* of the Plant Explorer.

Depending on the fieldbus protocol of the installed device type one respectively all of the following Object Types:

- DLW_PROFIBUS (for device types supporting PROFIBUS DP and PA.)
- DLW_HART (for device types supporting HART).
- DLW_FF (for device types supporting FOUNDATION Fieldbus H1 and HSE).

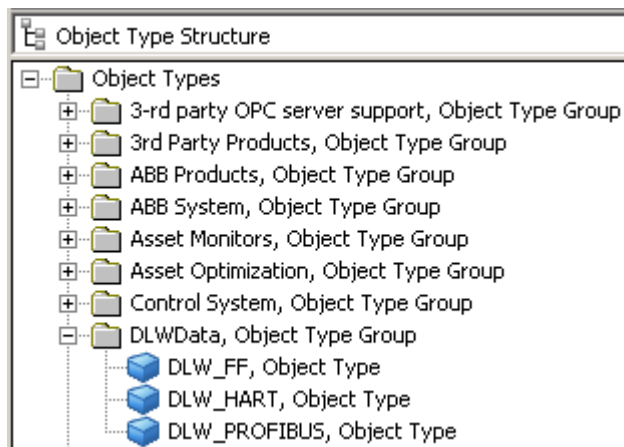


Figure 40. DLWData Object Types in the Object Type Structure

The object types below the **DLWData** folder based on 800xA generic object type with a special aspect created for the specific fieldbus protocol:

- DeviceLibInfo - PB Aspect
This aspect will store all history data related for installed device types supporting PROFIBUS DP and PA protocol.

- DeviceLibInfo - HART Aspect
This aspect stores all history data related for all installed device types supporting HART protocol.
- DeviceLibInfo - FF Aspect
This aspect stores all history data related for all installed device types supporting FOUNDATION Fieldbus H1 and HSE protocol.

History data are read out from the Device Library Wizard to display device types only, which have not been installed in the ABB 800xA system yet. These information will be stored in system backups and provided to the Device Library Wizard after system restore, for example, for system upgrade.



These object types and aspects do not require any further configuration by the user. Also, graphical user interfaces (windows) are not available to allow any configurations.

Section 5 Device Type Objects in 800xA

The information in this section provides a general description of the device type objects in 800xA system. Refer to *System 800xA Configuration (3BDS011222*)*, for more information on the standard workflow. It explains how to use device type objects.

Overview

For integration of PROFIBUS and HART field devices into the System 800xA environment ABB provides a continuously increasing portfolio of 800xA system tested and certified ABB and third party device types. They are available from System 800xA Media or from ABB SolutionsBank.

Each **device type** is represented in the *Object Type Structure* of the Plant Explorer by a **device type object**. ABB's Device Integration Center (DIC) creates these objects for the user and enriches them with all aspects for efficient device management over the entire life cycle, from the design phase to operation and maintenance. To assure interoperability of the system with the device and the related components, the new device type object is tested against the real device.

If a device type is not available in the ABB SolutionsBank, contact the Device Integration Center to request the creation of an additional device type object.



Notice that the DIC can neither guarantee to integrate a requested device type nor can it commit a specific date for an integration.

For further information, contact the DIC: dic@in.abb.com



PROFIBUS and HART device type objects are continuously enhanced. For a complete list of currently supported devices and functionality, refer to ABB webpage: (<http://www.abb.com/controlsystems>;
see: **Extended Automation System 800xA > Device Management > Device Integration Center > [Downloads Section]**).

PROFIBUS Device Type Objects

PROFIBUS DP and PROFIBUS PA device types certified for use in 800xA systems will be included through Device Library Wizard in the Device Integration Library repository of the *Object Type Structure* and *Library Structure*.

The PROFIBUS Device Integration Library contains ABB and third party device type objects enhanced with the essential aspects for

- Configuration, parameterization, commissioning and diagnostics.
- Asset Condition monitoring.
- Maintenance management (CMMS connectivity).
- Device documentation.

The PROFIBUS device types are delivered as Hardware Library Files, necessary for using PROFIBUS device type objects within 800xA engineering phase.

Device Type Objects in the 800xA System

A set of default PROFIBUS device type objects are delivered with 800xA Core System software, installed through AC 800M Connect system extension.

Additionally the PROFIBUS Device Integration Library in the 800xA system can be extended with device type objects, available from System 800xA Media or ABB SolutionsBank.

The PROFIBUS device types are stored in different location in the *Object Type Structure* of the Plant Explorer, based of the default and additional installed device types:

1. PROFIBUS Device Type Objects installed through Device Library Wizard:

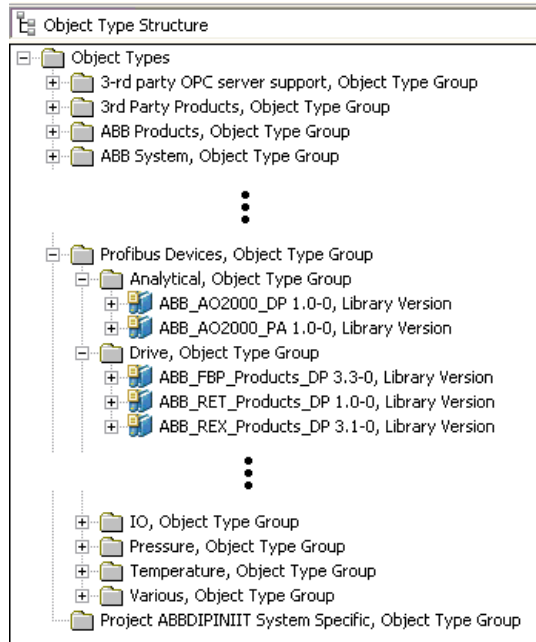


Figure 41. PROFIBUS Device Type Objects installed through Device Library Wizard

2. PROFIBUS Device Type Objects installed through 800xA system software:.

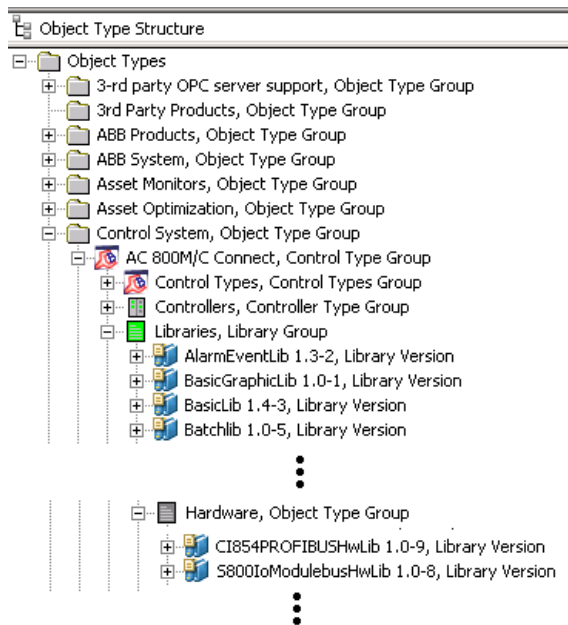


Figure 42. PROFIBUS Device Type Objects from 800xA System Software



User created PROFIBUS device hardware libraries through Device Import Wizard (started directly from the Control Builder project) are also located in the **Hardware** folder.

Prerequisites for Engineering

The following requirements must be met to create instances of PROFIBUS device type objects in *Control Structure* of the Plant Explorer.

- Install PROFIBUS device types through Device Library Wizard (if not done yet)
- Reserve project for exclusive modify access
- Insert Hardware Libraries to the project (PROFIBUS communication interfaces and device type objects)
- Connect Hardware Libraries to an AC800M controller
- Setting up a PROFIBUS fieldbus topology (Connect a PROFIBUS communication interface to the controller. The CI854PROFIBUSHwLib is used for the CI854(A), which enables acyclic communication (DP-V1) required for DTM access to the connected devices).



Refer to Section Configuration in *System 800xA Configuration (3BDS011222*)*, for more information.



AC800M Connect and *AC800M High Integrity* system extensions must be loaded before loading *PROFIBUS Device Integration Library - Basics* system extension.



HART Device Integration Library - Basics system extension must also be loaded if PROFIBUS device types with DTMs needs to be engineered.

Engineering of PROFIBUS Device Types

PROFIBUS device objects can be instantiated either in *Control Structure* of the Plant Explorer or in the Control Builder project window, whereas the object will be accessible in both structures.



It is recommended to know the device addresses of each PROFIBUS device, located on the PROFIBUS line, before starting the device instantiation. Download the Control Builder project with the CI854 instance first to get access to the Web Server, which offers PROFIBUS diagnostics (for example, Live List, Cycle Time, and so on). The Web Server is described in *AC 800M PROFIBUS Configuration (3BDS009030*)*.

Refer to *System 800xA Configuration (3BDS011222*)* for details, how to create an instance of a PROFIBUS device type in 800xA system environments.

Configuration and Commissioning of PROFIBUS Device Types

After instantiating (engineering) of a PROFIBUS Device Type Object it can be configured for applications by means of DTM or particular user parameter described in the device specific GSD file, which is included in the Hardware Library (HwLib).

Device configuration through DTM can be performed offline and online, whereas offline stores the configuration data in the instance data record (Aspect Directory) only, and online parametrization stores the configuration data also in the connected device. The PROFIBUS master must in run state and the physical device address must be known to establish an online communication. The device configuration may not be downloaded to the PROFIBUS master.

If the device can be configured with user parameter provided by the GSD (HwLib), these parameters can be configured before downloading the Control Builder project to the controller. The parameter are listed in the specific configuration window available in the Control Builder tool. The device configuration data will be set in the device after performing a project download.



Refer to *System 800xA Configuration (3BDS011222*)* for more details.



There is no synchronization of device configuration data between Control Builder project and the DTM. Device parameter, which may be necessary for both parts, must be configured in the Control Builder project and the DTM.

HART Device Type Objects

HART device types certified for use in 800xA systems will be included through Device Library Wizard in the Device Integration Library repository of *Object Type Structure* of the Plant Explorer.

The HART Device Integration Library contains ABB and third party device type objects enhanced with the essential aspects for

- Configuration, Parameterization, Commissioning and diagnostics
- Asset Condition monitoring
- Maintenance management (CMMS connectivity)
- Connection to Meriams Device Management System (DMS)
- Device documentation

All available HART Device Type Objects contains a DTM for configuration, commissioning and diagnosis. They can be inserted in *Control Structure* of the Plant Explorer at S800 I/O modules connected to the AC 800M Controller and S800 Remote I/Os as well as to S900 Remote I/Os. Additionally the HART Multiplexer Control Network allows instantiation of HART Device Type Objects.

Device Type Objects in the 800xA System

The *Object Type Structure* contains device type objects for corresponding device types.

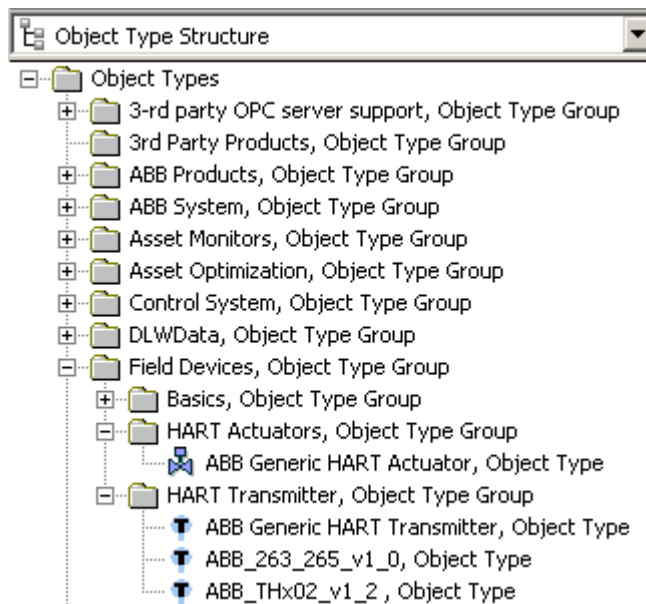


Figure 43. HART Device Type Objects in 800xA



For HART, device type objects are stored inside the **Object Types -> Field Devices** catalog.

The device type objects in the catalog **Basics, Object Type Group** are basic objects, which are **not** designed for direct use.

Use device type objects from **HART Actuators** and **HART Transmitter** Object Type Groups.

Prerequisites for Engineering

The following requirements must be met to allow instantiation HART device types to the 800xA system.

- Install device types through Device Library Wizard (if not done yet)
- Reserve project or controller for exclusive modify access (for instantiation controller reservation is required only).
- Setting up a fieldbus topology for HART
HART field devices can be connected together with the HART Multiplexer Control Network as well as with the AC800M controller on local S800 modules or through PROFIBUS communication interface (CI854) on remote I/O modules.
The following hardware libraries for the communication between the I/O modules with the controller are available:
 - S800CI801CI854HwLib
 - S800CI840CI854HwLib
 - S900IoCI854HwLib
 - S800IoModulebusHwLib



Do not use hardware libraries including CI851, CI830 in the file name. The CI851 and CI830 do not support the acyclic communications (DPV1) as necessary for data exchange between DTM and field devices.



Field devices that support the HART protocol may only be placed below I/O modules that support this protocol in hardware and software (DTM) technology.



For more information on prerequisites, see Configuration section in *System 800xA Configuration (3BDS011222*)*.



AC800M Connect and *AC800M High Integrity* system extensions must be loaded before loading *HART Device Integration Library - Basics* system extension.

Engineering

HART devices can be instantiated in *Control Structure* of the Plant Explorer only.

After the field device is inserted in the fieldbus topology they are located below multi-channel I/O modules.



HART Device Type Objects are not visible in the Control Builder project. Therefore in the Control Builder tool it is possible only to use the analog signal of the HART device at an I/O module channel.

Channel Allocation on I/O Modules

Field devices that support the HART protocol must be assigned to the relevant channel of the I/O module.



HART field devices are managed exclusively by the Fieldbus Builder PROFIBUS/HART in *Control Structure* of the Plant Explorer. Use the **Fieldbus Management** aspect at the I/O module for channel allocation.



Refer to *System 800xA Configuration (3BDS011222*)*, for more information on inserting, configuring and operating HART device types in *Control Structure* of the Plant Explorer.



An additional configuration step is required for channel allocation of HART devices using Bulk Data Manager. Create the Hart device, and then allocate the device to the channel. Follow the same configuration procedure to create submodules for PROFIBUS devices. Create the PROFIBUS device, and then create the submodule.

Configuration and Commissioning of HART Device Objects

After instantiation and channel allocation the HART device objects can be configured for application by means of DTM.



Refer to *System 800xA Configuration (3BDS011222*)*, for detailed description to configure HART devices in *Control Structure* of the Plant Explorer.

In this release, it is possible to use DTMs along with AI880 module for safety. This requires enabling HART read only mode in DTM. Refer to the following documents for more details on how to enable them for ABB Third party DTM Library and Generic HART DTM.



Refer to *2PAA105446_ABBThirdPartyDTMLibraryHandlingforSafetyMode* for detailed description to configure ABB Third Party DTM library and AI880 Module for safety operation.



Refer to *System 800xA Device Management Basic HART DTM, Configuration (3BDD011939*)*, for detailed description to configure Basic HART DTM and AI880 Module for safety operation.

PROFIBUS and HART Device Type Object Functionality

The installed device types represented as device type objects in the *Object Type Structure* of the Plant Explorer contains aspects for various system functionality. After instantiation of the particular device type object in *Control Structure* of the Plant Explorer, the following features may be available depending on the device type:

- **Device specific functionality**
 - DTM for configuration, commissioning and diagnostics
 - Device specific documentation
- **800xA System functionality**
 - Alarm and Event Lists
 - Audit Trail support
(Audit Trail messages are included in the Alarm and Event List)
- **Asset Optimization functionality**
 - Device Asset Monitors
Asset Optimization allow plant personnel to collect, compare, and monitor field device data in order to accurately assess equipment conditions.
- **CMMS Connectivity (Computerized Maintenance Management System)**
 - Maximo connectivity
 - SAP connectivity
- **Device Management System (Calibration) for HART devices**
 - DMS connectivity
Device Management System (DMS) allow plant personnel to store, distribute and to manage calibration data from HART devices in the 800xA system.



For a complete list of currently supported devices and functionality, refer to ABB webpage: (<http://www.abb.com/controlsystems>; see: **Extended Automation System 800xA -> Device Management -> Device Integration Center > [Downloads Section]**)

Device Type Manager (DTM)

The DTM is a software component, which is usually delivered by the manufacturer of the intelligent field device. The DTM is familiar with the way the field device works (plausibility) and contains graphical user dialogs essential for device configuration, parameterization, diagnostics, and provide the device specific documentation. The DTM enables the field devices to be operated in the Fieldbus Builder PROFIBUS/HART conforming to FDT 1.2.

ABB provides tested device types which can be installed through Device Library Wizard. Three types of DTMs dedicated to device type objects can exist in 800xA system:

- **Device Specific DTM**
- This type of DTM is used for PROFIBUS and HART protocol, if assigned to a device type object.
- **DD / EDD based DTM**
- This type of DTM is used for HART protocol only, if assigned to a device type object.
- **ABB Basic DTM**
- This type of DTM is used for PROFIBUS and HART protocol, if assigned to a device type object.

On the following pages each of the listed DTM type is described in more detail. Consider that the included screen shots of the DTM represents a general example only and may differ from other used DTMs in the system. All examples here show the DTM Diagnostics application.

Check the product documentation of each installed device type containing a DTM, if a special DTM Guide is included. Mostly those guides describes special DTM handlings and functions.

If the 800xA Documentation delivered on the System 800xA Media is completely installed on the system node, instruction manuals for DTM installed through Device Management PROFIBUS and HART can be used for further help.

Use the windows start menu to access the specific user documentation:

For Device Management PROFIBUS:

Click **ABB Start Menu > ABB Industrial IT 800xA > Documentation > Device Management > ...**

For Device Management HART:

Click **ABB Start Menu > ABB Industrial IT 800xA > Documentation > Device Management > ...**

Device Specific DTM

The device specific DTM is provided by the device vendor and contains the full capability to configure, parametrize and diagnosis the connected device type. All user interfaces (applications) are designed in a way to work easily with the device type without adequate knowledge of the device and the supported fieldbus. Function wizards are mostly included to provide a guided way for special configuration as well as to get device specific diagnosis. Because of encapsulated coded functionality the DTM provides more features as delivered with the device description file (DD) to save vendor specific knowledge.

The DTM and associated features are provided by the device manufacturer.

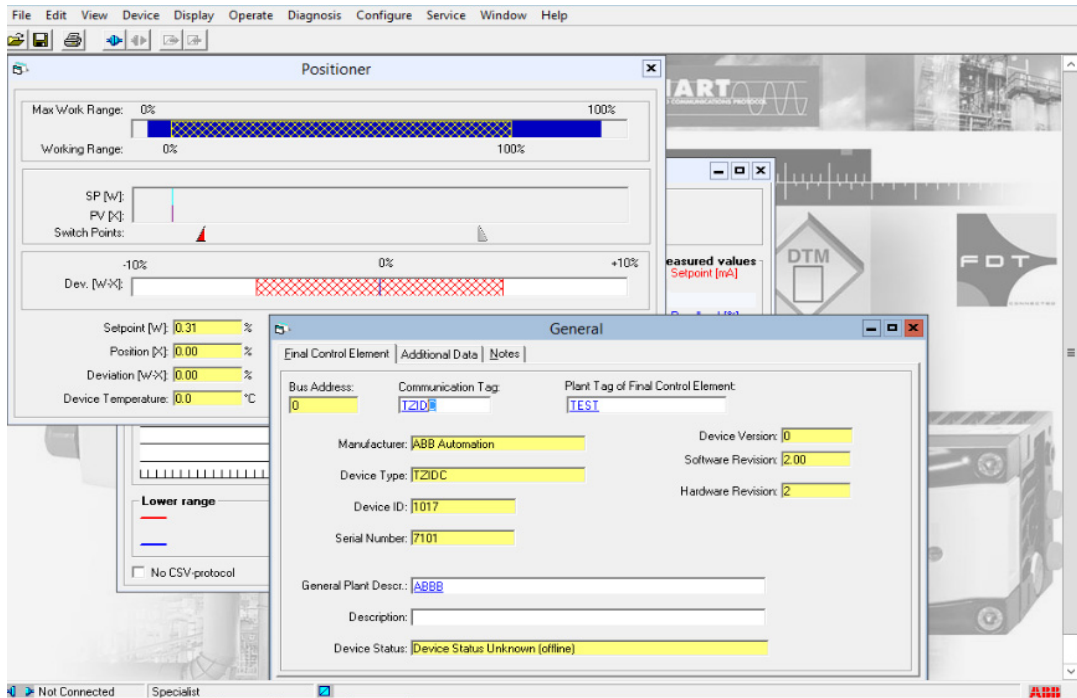


Figure 44. Example of a Device Specific DTM from ABB



Device specific DTMs may require additional licenses, which are not subject to the System 800xA licensing arrangements and are not included in the Device Management PROFIBUS and HART. Licenses for device specific DTMs should be applied for from the relevant device manufacturer. Read the release notes provided to each specific device type, if additional license agreements need to be considered.



Device Types installed through Device Library Wizard, which have a specific Device Type Manager (DTM), may require special Windows settings on the system node. If these settings have not been configured, it is not possible to open the DTMs from other system user accounts except 800xA Service Account.

If a DTM menu is not displayed or the DTM is not opened properly, check

- if the device type object is installed correctly. This is also related to the DTM.
- if special settings have been made on the system node according to the device specific Release Notes. Changes have to be done on all system nodes, where those device objects are used.



Some Device Type Manager (DTM) do not support the user roles in 800xA System correctly. For example, the 800xA Operator could have DTM access rights of an Administrator.

Therefore, user must avoid the tasks which does not belong to the corresponding user role.

DD / EDD based DTM

If the device vendor does not have a device specific DTM, but can deliver a device description file (DD or EDD) designed for the device type, ABB offers the possibility to build a DD / EDD based DTM. DDs are delivered in a readable ASCII text file.

DD based DTMs contains simple but efficient graphical views for the most required functions like configuration, observation and diagnosis. Configuration and parametrization views are mainly allow text orientated configuration. The configured data set is checked through internal business rules to ensure a proper working device. Special device functionality may be not available.

Online Parameterize, Value Adjustment, Observe, Diagnosis, Range Values, Process Trends are mainly supported features in communication enabled mode. Offline Parameterize feature is used in communication disabled mode.

The Diagnostic application shows notes, warnings and errors belonging to the field device in accordance to the DD specification.

Changed values shall be confirmed with **Return** on the keyboard.

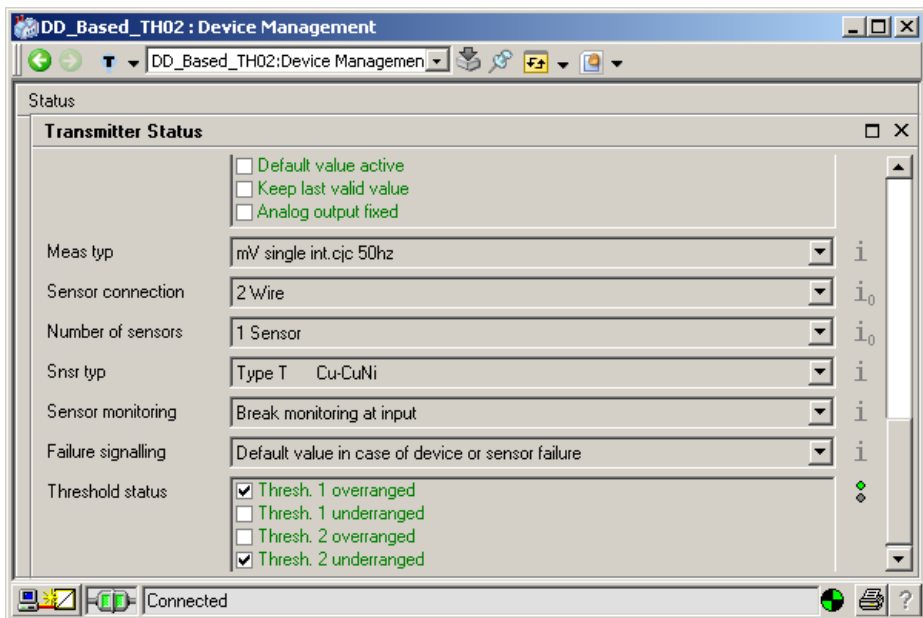


Figure 45. Example for a DD based DTM



Note that DD / EDDs are mainly designed for online access to the connected HART device. Therefore the configuration view (offline mode) may not offer the full capability to prepare a complete pre-configured device set. As a result online parametrization might be required after data download through DTM.

If a device data set is uploaded to the DTM, the parameter in the Configuration view (offline mode) are stored persistent in the instance data set on the 800xA Aspect Server only, which can differ to the Parametrization view. All additional parameter visible in the Parametrization view are lost after closing the DTM.

The process to created DTMs out of DDs described in this section cannot be performed by the user, but by ABBs Device Integration Center (DIC) only. Read chapter [Overview](#) on page 109 in this section for more details.

Basic DTM

Basic DTMs provided by ABB allows configuration based on fieldbus standards. Both DTMs are installed with 800xA Device Management PROFIBUS/HART software package as a basic type without extensions.

Basic HART DTM

The Basic HART DTM is used for all HART field devices, where neither a device specific DTM nor a DD file for a DD based DTM is available from the device manufacturer. This DTM include the functionality based on HARTs universal and common practise commands according HART revision 5 and 6. This allows the user to make rudimental device configuration and diagnosis. Also, special functions like device self test and zero trim is possible, if the device supports this feature. The HART analog value as well as the 4 additional values are visible in the observe window in a graphical view.

The Basic HART DTM can be enhanced with new DTM application designed for a specific device type. Those applications are build with the HART DTM Builder, which can be executed within the Basic HART DTM runtime environment.

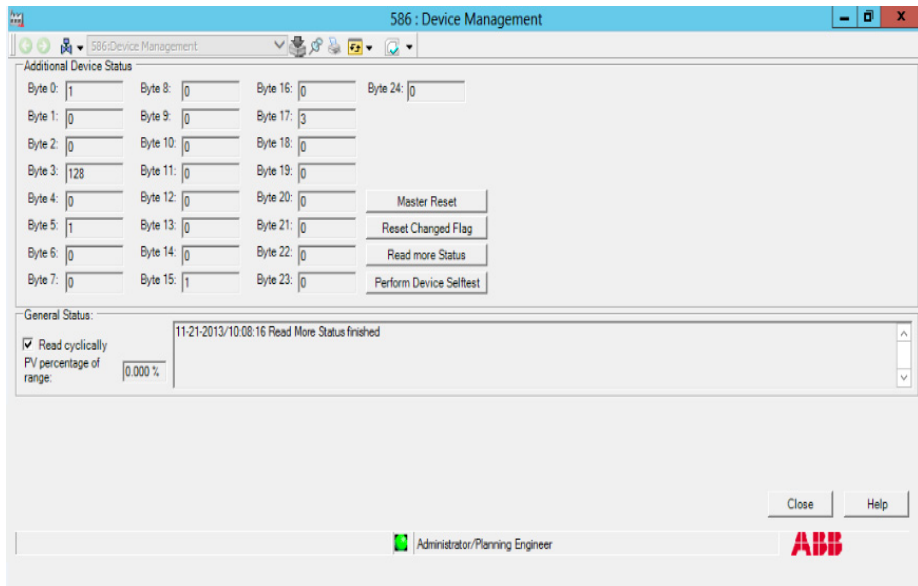


Figure 46. Basic HART DTM Diagnostics view



Details to the Basic HART DTM is described in *Device Management Basic HART DTM 5.2 (3BDD011939*)*.

Basic PROFIBUS DTM

The Basic PROFIBUS DTM is the runtime environment for device specific applications (templates) created by the Device Integration Center (DIC). Those

applications allows direct access to the PROFIBUS device type with the full capability of easy to use graphical windows.

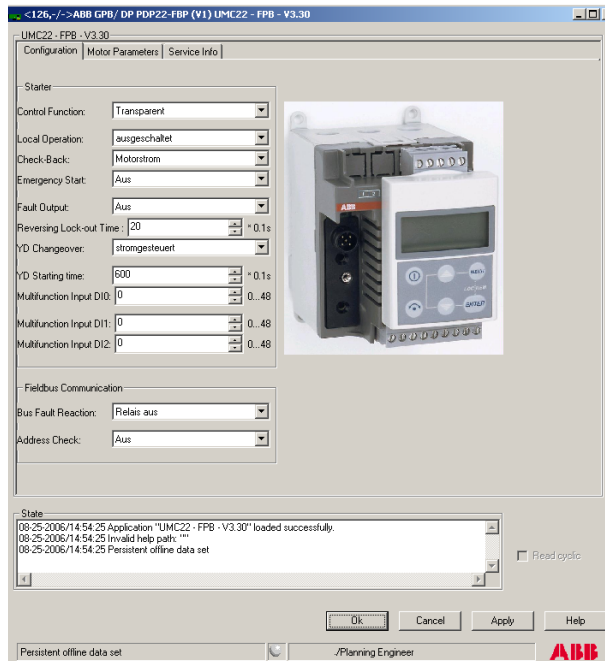


Figure 47. Basic PROFIBUS DTM with device specific template application



Details to the Basic HART DTM is described in *Device Management Basic PROFIBUS DTM 5.3 (3BDD011938*)*.

Aspects in the Object Type Structure

The *Object Type Structure* contains the device type objects to be used in the projects.

Additional device type objects will be installed to the 800xA system through Device Library Wizard. Depending on the system license features can be used without additional configuration work.

The following aspects are attached to PROFIBUS and HART type object:

- **Product Documentation**
Access to various device specific documentation. For accessing a single document, refer to [Product Documentation Aspect](#) on page 132.
- **PROFIBUS or HART <generic/specific> Asset Monitor**
Asset Monitor acquire and analyze asset status and condition information. They notify operators and maintenance personnel when an abnormal condition calls for maintenance action.
- **DIP Asset Object Types Extension Definition**
This aspect organizes the **Asset** aspects during instantiation.
- **DIP CMMS Object Type Extension Definition**
This aspect organizes the **CMMS** aspects during instantiation.
- **DIP Maximo Object Type Extension Definition**
This aspect organizes the **Maximo CMMS** aspects during instantiation.
- **DIP DMS Object Type Extension Definition**
This aspect organizes the **DMS** aspects during instantiation (only for specific HART device type objects).



The aspects described here are configured for the device type objects installed with the Device Library Wizard, do not need any other settings.

Aspects in the Control Structure

After instantiation of the specific device type object, aspects may directly be accessible depending on the installed 800xA system functionality and device type. Aspects not listed in this section may be created by default from the system and be described in the system documentation. For the engineering and operation work of a device type object the following aspects shall be used only, if applicable:

Fieldbus Management Aspect

This aspect is used to open the graphical user interface of the Fieldbus Builder PROFIBUS/HART. Fieldbus Management is mainly to be used for HART channel assignments, to manage the communication operating modes and to start device data upload or download. Furthermore it can be used to save historical data set to document the life cycle of the device instance record and to configure the OPC Server PROFIBUS/HART.



Refer to [Fieldbus Management Aspect](#) on page 49 for more details.

Device Management Aspect

The **Device Management** aspect is provided by the Fieldbus Builder PROFIBUS/HART and opens the associated DTM with the device instance data record.

In Device Management, the Fieldbus Builder PROFIBUS/HART operates in the background and cannot be seen by the user. Its primary task is to call the associated DTM and supply it with data, and to ensure that the instance data is saved to the Aspect Server directory.



Refer to [Device Management Aspect](#) on page 65 for more details.

Alarm / Event List Aspect

The alarm and event list contains all events related to the specific device type object, for example. messages from the asset monitor, device diagnosis, communication problems, system alarm/events, and so on.

Product Documentation Aspect

Device specific documentation is available in the **Product Documentation** aspect, assigned to the device type object. Some device type objects can be used for a certain number of physical hardware types with different device documentation. To work with the **Documentation** aspect, follow the instructions below:

1. Select the **Product Documentation** aspect of the device instance.

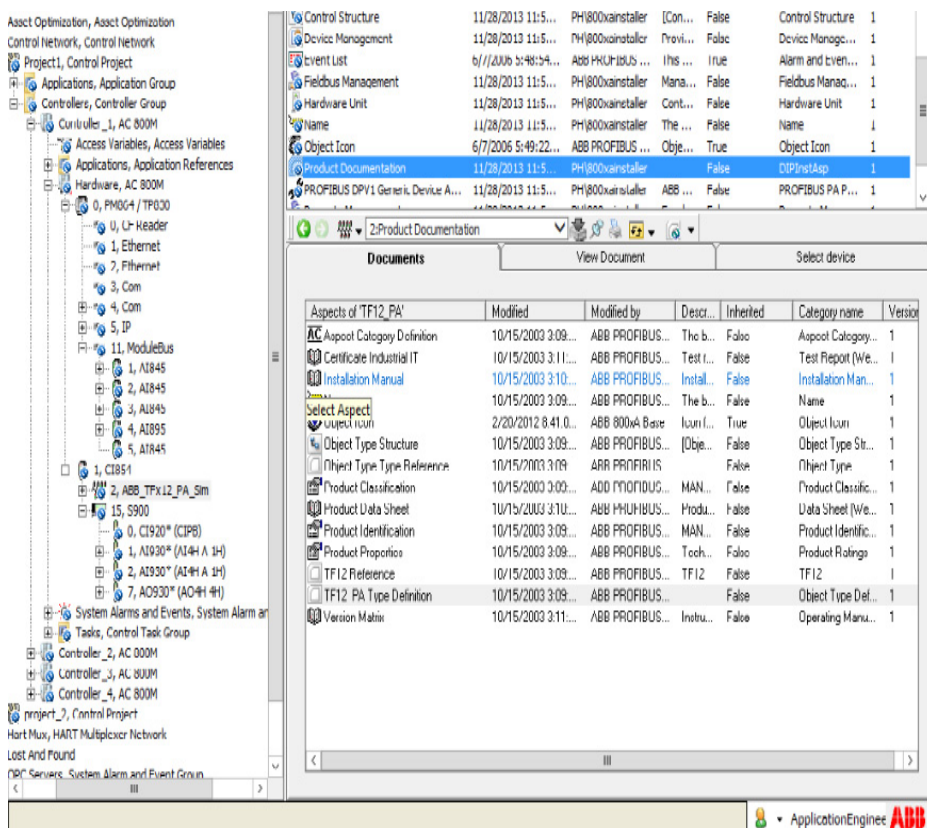


Figure 48. Product Documentation aspect

2. Select the device type, if applicable.

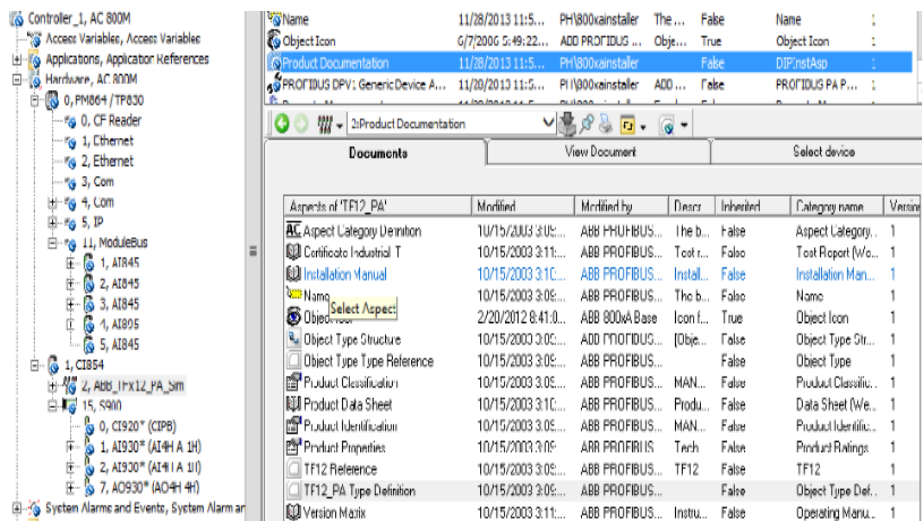


Figure 49. Select Device view



The selected device type is stored in the Aspect Directory. If the aspect is closed and reopened again, a new selection is not required and the specific product documentation is directly shown.

3. Select device specific document, for example, **Product Data Sheet**.

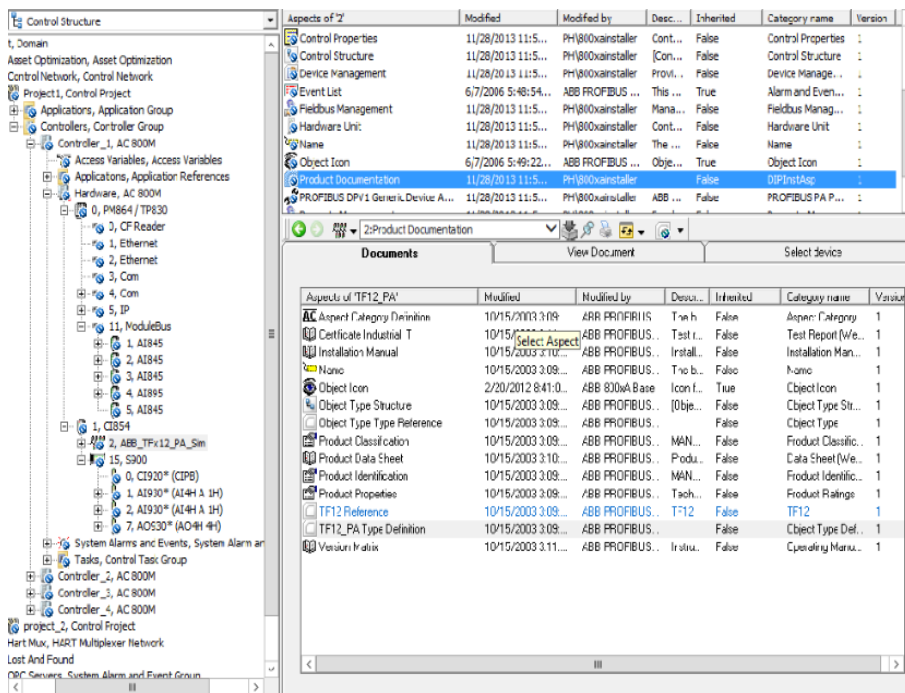


Figure 50. List of Device Specific Document



The Documentation tab shows aspects assigned to the corresponding device specific user documentation as well as aspects with 800xA system functionality.

Do not select aspects in this view, which does not contain device documentation.

Additional 800xA System Documentation



The 800xA specific documentation is installed through 800xA Documentation setup. The complete installation selectable during setup installs the system configuration manuals, whereas the typical installation will included the operation manuals only.

Additional 800xA system configuration documentation are available through windows start menu:

Click **ABB Start Menu > ABB Industrial IT 800xA > Documentation**

- DevMgmt-Profibus
- DevMgmt-HART
- Control
- Asset Optimization
- IIT800xA System

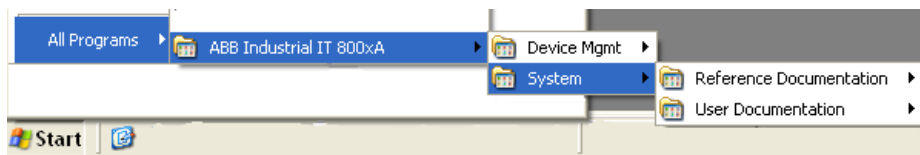


Figure 51. 800xA Documentation



800xA Documentation must be installed on each system node to access further system and product documentation through Windows Start menu.

Device Specific Asset Optimization Aspects



For the following functionality the Asset Optimization, CMMS (Maximo or SAP) and DMS (Meriam) software and system extensions shall be installed.

System 800xA- Asset Optimization consists of system extensions to the 800xA system product. Asset Optimization allow plant personnel to collect, compare, and monitor field device data in order to accurately assess equipment conditions.

Information can subsequently be used to set future performance and profitability goals and to assist managers in making these decisions.



Refer to *Asset Optimization, Configuration (3BUA000118*)* for more details of Asset Monitoring, CMMS and DMS Connectivity.

Asset Monitoring Functionality



Precondition: Asset Optimization with Asset Optimization (Server) system extensions have to be installed.

Asset Monitoring provides the infrastructure that monitors analyzes and reports asset status/condition information. It notifies operators and maintenance personnel when an abnormal condition calls for maintenance. Asset Monitoring interacts with third-party CMMS applications to optimize the use of plant equipment and processes.

An *Asset Monitor* is an application for retrieving data from, and interacting with, multiple data servers, for example, OPC Servers. Asset Monitors can detect problems that may not affect the process variables, but do affect the maintenance status of an asset or process.

The aspects listed in the tables below are added to the device type object during instantiation, if the related software option is installed and licensed.

The table description contains the information, which aspect in the *Object Type structure* is responsible to make the listed *Control Structure* aspects available at the instance.



The HART/PROFIBUS Device Asset Monitor Aspect comes with pre-configured Asset Monitor properties. The HART/PROFIBUS Device Asset Monitor property resides in the same Object as the Asset Monitor. It is recommended to replace the Object name with the %ID% if the default properties are modified for any reason. For more information, refer to *Asset Optimization, Configuration (3BUA000118*)*.



For information on handling device types asset monitors and severity levels, refer to *System 800xA Device Types Asset Monitor Handling & Severity Levels, Technical Description (2PAA104701)*.

Table 8. DIP Asset Object Types Extension Definition

Aspect	Function
Asset Reporter aspect	The Asset Reporter provides a detailed view of an asset condition for an object. It displays information available to it from all Asset Monitors and their corresponding current sub-conditions.
Asset Viewer	When the Asset Viewer is added to an object, the Asset Condition Tree can be displayed. When displayed, the Asset Condition Tree shows the condition of that object and all its children, visually indicating the presence of a fault report by displaying items in bold text. Context menus permit fault report submission directly from within the Asset Viewer.

Table 9. PROFIBUS Type Object: DIP Asset Object Types Extension Definition

Aspect	Function
PROFIBUS Generic Asset Monitor aspect	Generic asset monitor for devices for monitoring the diagnosis states of PROFIBUS device.
PROFIBUS <specific> Device Asset Monitor aspect (optional)	Specific asset monitor for devices for monitoring device specific conditions of PROFIBUS device.

Table 10. HART Type Object: DIP Asset Object Types Extension Definition

Aspect	Function
HART Generic Device Asset Monitor aspect	Generic asset monitor for devices for monitoring the status byte states of HART device.
HART <specific> Device Asset Monitor (optional) aspect	Specific asset monitor for devices for monitoring device specific conditions of HART device.

CMMS Connectivity



Precondition: Asset Optimization with SAP or Maximo system extensions and the specific CMMS software have to be installed.

CMMS Connectivity establishes the link that removes the barrier to information exchange between the CMMS and the process control system environments. It also brings maintenance management to the operator environment.

Context menus for process graphics, the alarm and event list, and so on, provide access to a number of views and actions for the specific CMMS item. This allows plant personnel to collect, compare, and monitor field device data in order to accurately assess equipment conditions.

The device type object provides a **CMMS Connectivity** (aspect) connection to the "Computerized Maintenance Management System" (CMMS).

The aspects listed in [Table 11](#) are added to the object type during instantiation.

Table 11. DIP CMMS Object Type Extension Definition

Aspect	Function
Fault Report Submitter	The Fault Report Submitter aspect makes it possible to submit Fault Reports to the CMMS and DMS systems.
View Active Work Order	Lists all active work orders in the CMMS for a particular asset or group of assets.
View Equipment Status	Allows data returned from a status assessment of an asset or group of assets to be viewed.
View Preventive Maintenance Schedule	Lists the preventive maintenance schedule for an asset or group of assets.
View Spare Parts	Lists spare parts in the CMMS for a particular asset or group of assets.
View Work Order History	Lists the history of all work orders in the CMMS for a particular asset or group of assets.
Maximo Equipment ID	The Maximo Equipment ID provides information for mapping the Industrial ^{IT} object to the Maximo equipment in the CMMS database for a particular Maximo Server. Multiple Maximo Equipment IDs can be associated with the same asset, thus providing the ability to map to more than one piece of equipment defined in Maximo.
SAP Equipment ID	The SAP Equipment ID provides information for mapping the Industrial ^{IT} object to the SAP equipment in the CMMS database for a particular SAP Server. Multiple SAP Equipment IDs can be associated with the same asset, thus providing the ability to map to more than one piece of equipment defined in SAP.

DMS Connectivity

This feature is currently available only for HART protocol. DMS Connectivity establishes a connection between the 800xA system and the instantiated HART device to the Meriam Instruments Device Management System for device calibration



Precondition: Asset Optimization with DMS system extensions and Meriam Instruments DMS have to be installed.

The aspects listed in [Table 12](#) are added to the object type during instantiation.

Table 12. Additions for interfacing with DMS

Aspect	Function
DMS	The DMS aspect opens the Meriam Device Management System and allows the user the configuration of calibration procedures.
DMS Asset Monitor	Asset monitor for the DMS system
Parameter Mapping	Enables access to parameters, for example, of a DTM through parameter mapping
Property Management	For internal use only



The aspect 'Calibration Event List' on object 'Control Network' and 'Generic HART Transmitter' will be unconfigured if DMS Calibration Connect is not loaded. In this case consistency tool will report error or when a user clicks on 'calibration event list' aspect, then a message 'Could not connect to the configuration aspect' will appear. In case DMS calibration Connect is not loaded, then ignore the messages from consistency tool and/or Calibration event list.

Section 6 HART Object Type Wizard (Optional)

The *HART Object Type Wizard* can be used to create user-defined HART Device Type Objects in the *Object Type Structure*, which are not yet a part of the Device Integration Library. The created HART Device Type Object is based on the Generic HART Transmitter/Actuator and uses the Basic HART DTM for device configuration and commissioning.

This tool cannot be executed directly from the 800xA system, must be started manually from the Windows Start menu:

Click **ABB Start Menu > ABB Industrial IT 800xA > Device Mgmt > HART Object Type Wizard**



Only Device Type Objects used in the 800xA system, created as per the instructions in this section and based on the Basic HART DTM are permitted.

Manual created Device Type Objects cannot be automatically updated with Device Type Objects installed through Device Library Wizard and included in the HART Device Integration Library. Also, new features provided with the Device Management and 800xA System software are not assigned to these self-made Device Type Objects.

Creating new HART Device Type Objects



The use and modification of existing object types is only permitted for development and test purposes. In terms of software, the templates are only suitable for test and development.

Two predefined templates are available:

- **Generic HART Actuator** with assigned Basic HART DTM.
- **Generic HART Transmitter** with assigned Basic HART DTM.

The templates are located in the following *Plant Explorers Structure*:

Object Type Structure > Object Types > Field Devices > Basics > DTM Templates

Perform the following steps to create a new object for a new HART field device:

1. Start the *HART Object Type Wizard* through the Windows Start menu.

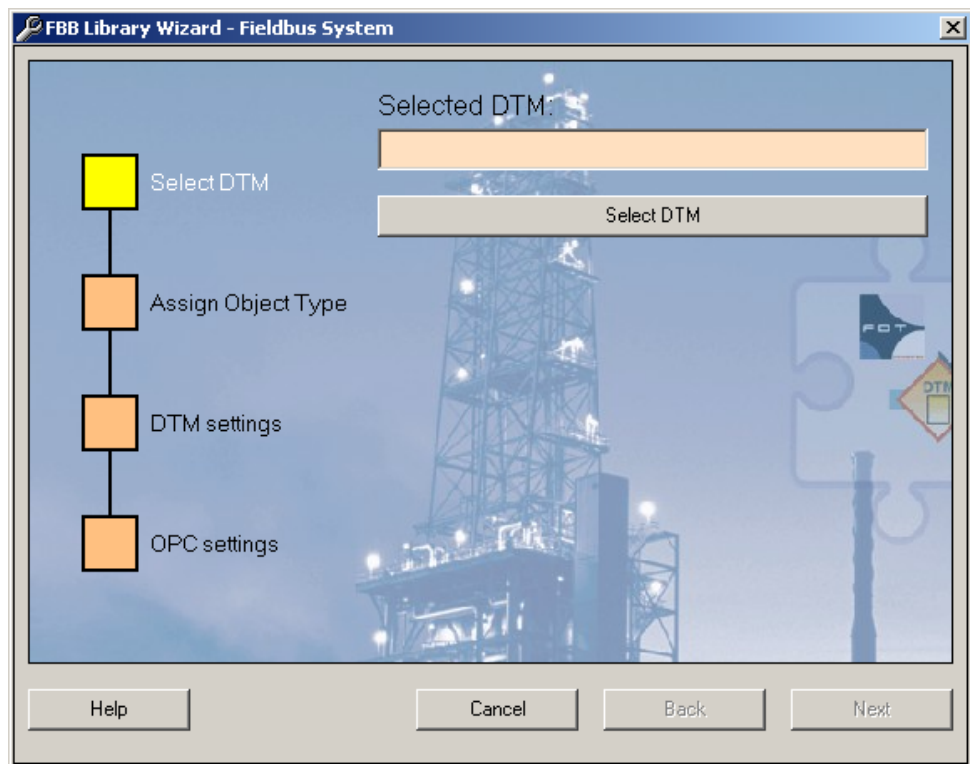


Figure 52. Fieldbus Builder PH Object Wizard start window

2. Click **Select DTM**.

3. In the browser, select the *Basic HART DTM* -> *Generic HART DTM*.



It is strictly prohibited to select other DTM as the Generic HART DTM, which is based on the Basic HART DTM.

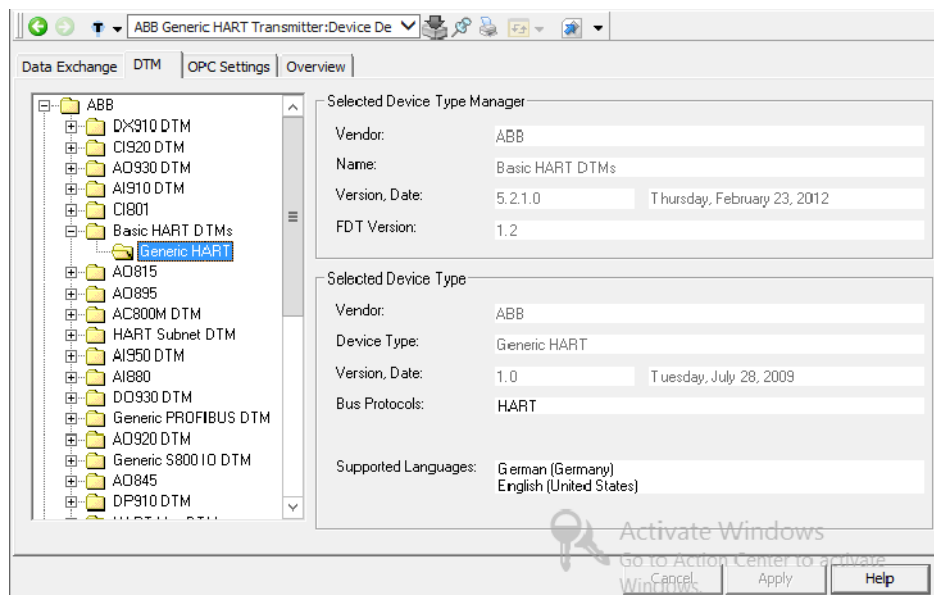


Figure 53. Select DTM window

4. Click **OK**.
5. Click **Next** in the main window.
6. Select in the new window one of the following existing templates:
 - **Generic HART Actuator**
Use this template, if the physical device type is connected to a HART AO module.
 - **Generic HART Transmitter**
Use this template, if the physical device type is connected to a HART AI module.

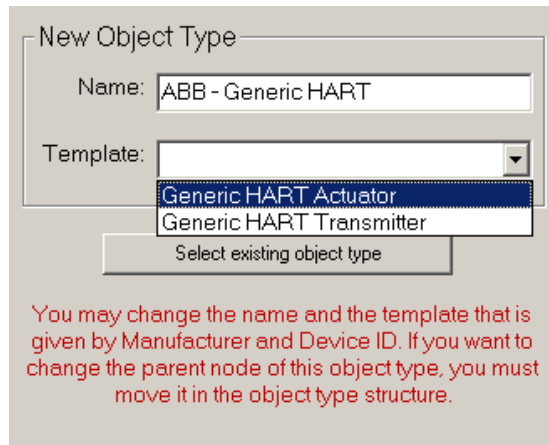


Figure 54. Select a Generic Template

7. If required, change the name of the new object type.



The name entered here is used to identify the Device Type in the *Object Type Structure* and enables unique naming in a specific object type.

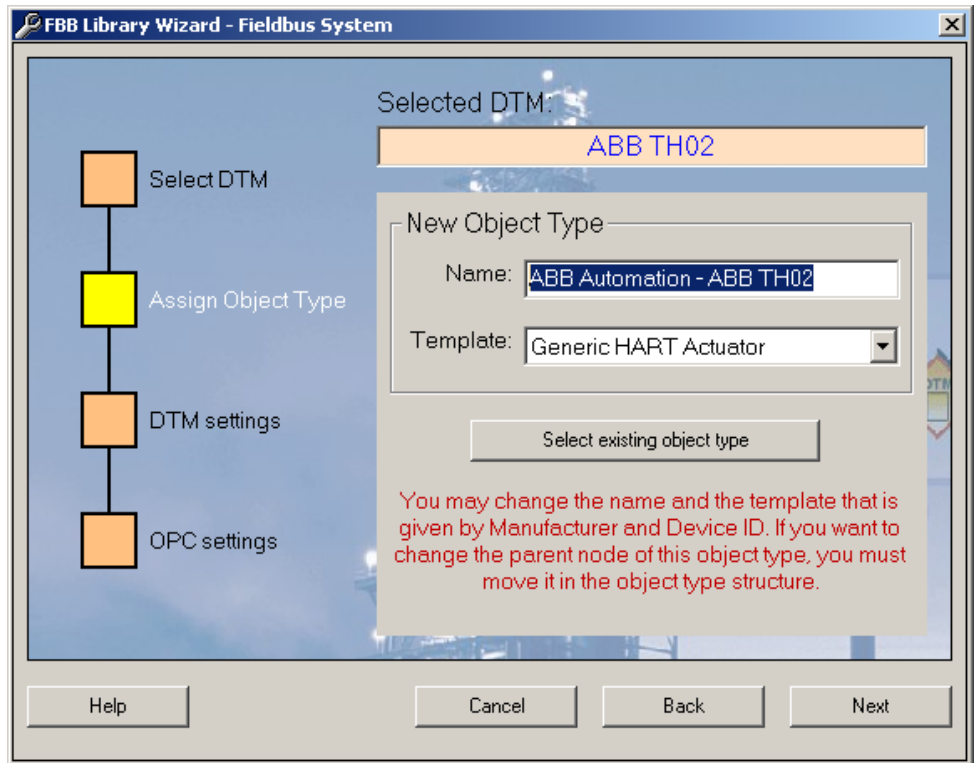


Figure 55. Example of Device Type Adjustment

8. Click **Next**.

The *DTM Setting* window is used to edit address parameters if these are required by the DTM. For example, address information available as a property in the 800xA system can be accessed here. If a device object has a number of individual modules, both the source aspect in which the module is defined and the specific property can be configured in the screens with the address setting for a specific assignment.



As the address information permitted in the 800xA system is already configured on the HART device template, the input fields must do not be changed.

9. Do not edit the window. Click **Next**.

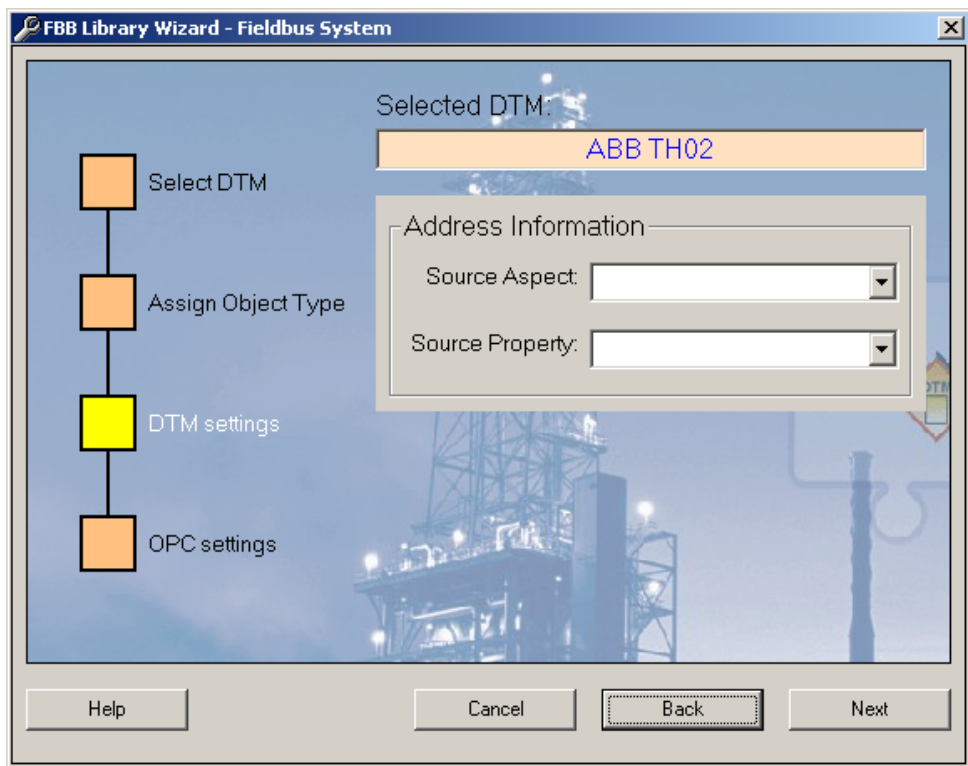


Figure 56. Address Information

The *OPC Settings* window is used to assign an alternative OPC-compatible DTM to the Device Type Object. The OPC can be used to access field device internal data and is required for the execution of asset monitors.

The generic HART template features a standard asset monitor for the general condition status of the field device. OPC communication is only permitted for the generic HART device type through the *Basic HART DTM*. If OPC access is not required, the configuration can be completed by clicking **Finish**.

10. If OPC access for Asset Monitoring is required, then click **Select DTM**.
11. Select **Basic HART DTM > Generic HART DTM**.

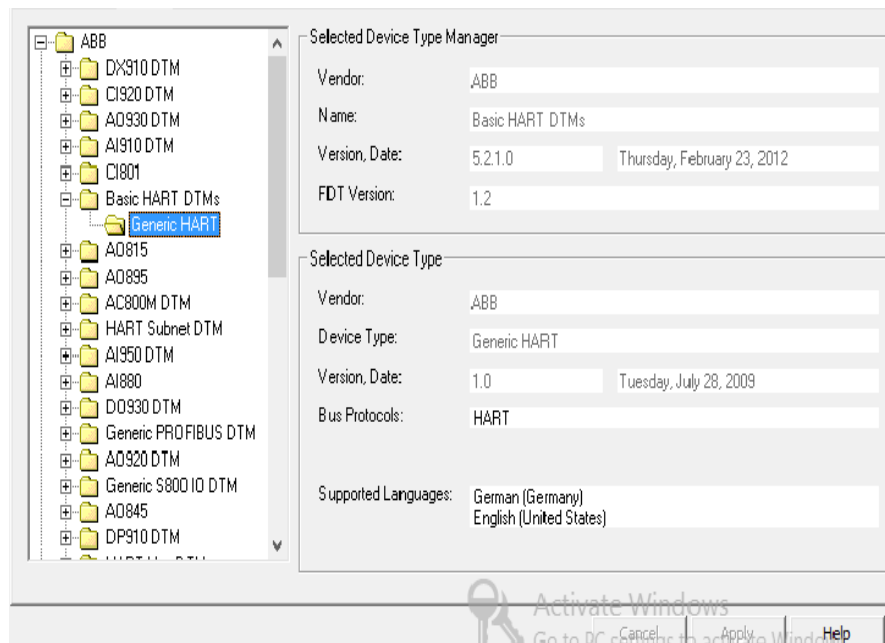


Figure 57. Basic HART DTM with OPC Access

12. Click **OK**.
13. Click **Finish** in the main window.

The new Device Type Object is set in the *Object Type Structure*.

Clicking **Cancel** quits the Wizard, and clicking **Next DTM** restarts it. The new Device Type Object is viewed under the following structure in the Plant Explorer:

Object Type Structure > Object Types > Field Devices

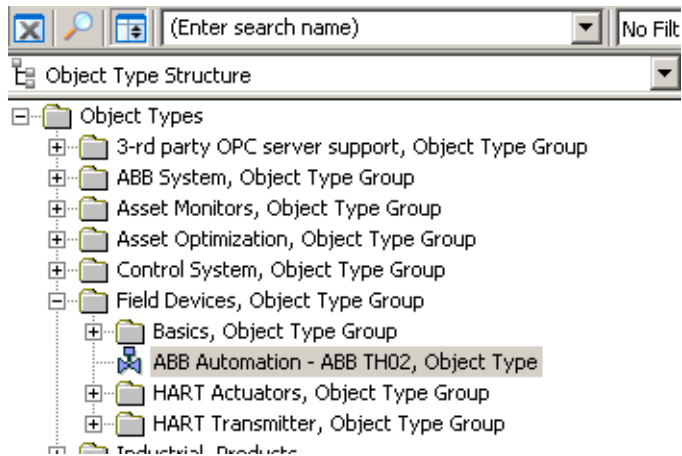


Figure 58. New device object type in the Object Type Structure



For increased clarity, the new device object can now be moved to the existing Object folder in the *Object Type Structure* (drag-and-drop).

Change Object icon (optional):

1. Select the **Object Icon** aspect in the new object.
2. Select **Set Icons** in the aspect window.
3. The browse window appears that enables to select a folder with the Icon Library. When Plant Explorer is installed, an icon folder is created with predefined icons under:
<Install drive>:\Program Files\ABB Industrial IT\Operate IT\Process Portal A\Icons
4. Select the new icon.
5. Click **Apply to** confirm the selection.

Section 7 HART Multiplexer Connect

System Overview with HART Multiplexer Connect.

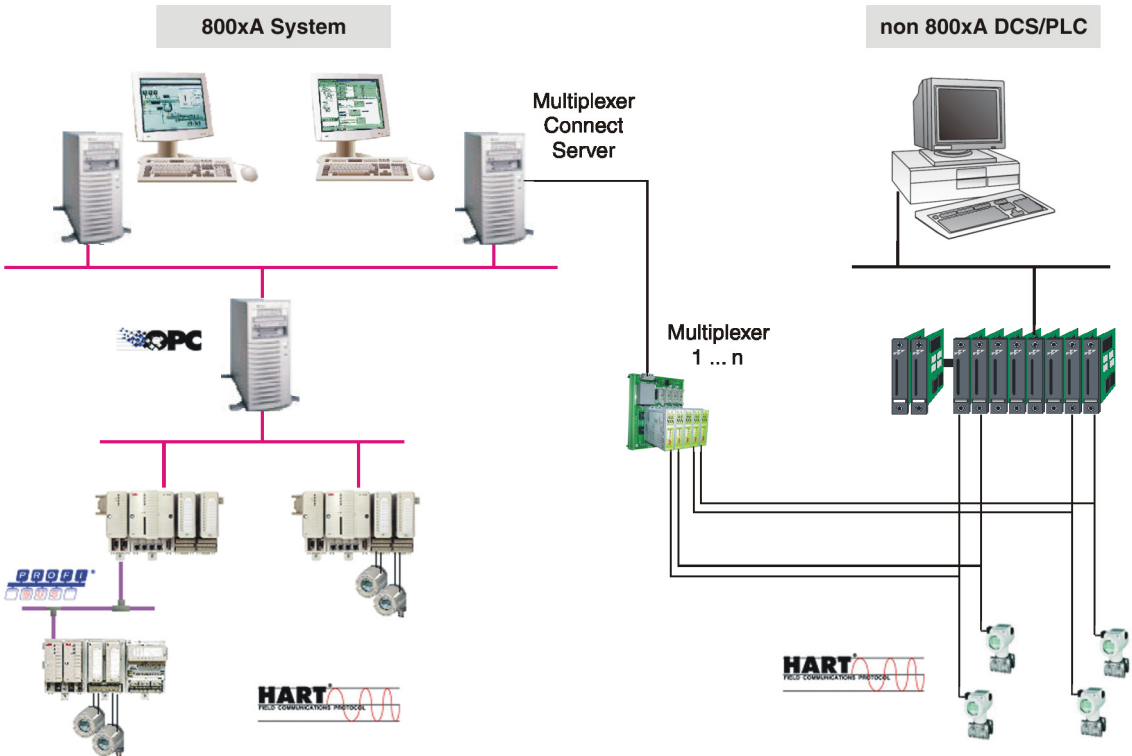


Figure 59. System Overview with HART Multiplexer Connect

The HART Multiplexer Connect enables communication between HART devices, connected to different DCS/PLC than 800xA, and the 800xA system. This makes it possible to integrate HART devices into the 800xA system and allows use of 800xA system features like Asset Monitoring, device configuration and diagnosis.

To establish HART communication between the devices and the 800xA system at least the following requirements must be fulfilled:

- The HART devices are connected through Multiplexer to a system node (RS232/RS485.)
- 800xA System is installed and licensed.
- Device Management PROFIBUS and HART is installed and licensed.
- HART Multiplexer Connect is installed and licensed.

Two communication DTMs build the base for the Device Management PROFIBUS and HART through the Multiplexer:

- **HART Subnet DTM**
includes the HART Server from HCF (HART Communication Foundation.)
- **HART Mux DTM**
used to represent the Multiplexer devices of the HART network.



Communication DTM means in this documentation both single DTMs.



HART Mux DTM needs to be installed on every machine it is supposed to be instantiated. HART Server needs to be installed on every machine connected to the Mux Network through RS232 / RS485 port. There cannot be more than one HART Servers running on the same machine.



This section describes two different types of server:

- **OPC Server PROFIBUS/HART**
The OPC Server PROFIBUS/HART provides device specific data to the Asset Monitors, which is supplied with the device type for the individual device type objects.
- **HART Server**
The HART Server act as the interface between the OPC Server PROFIBUS/HART and the underlying physical HART network including Multiplexers, connection panels, channels and devices.

A Multiplexer is an addressable piece of equipment that connects to a network. It may have additional connection modules called panels. Ultimately, it bridges communication between the controlling network and multiple instruments attached through a channel.

The following HART Multiplexer are supported:

- Pepperl+Fuchs: KFD2-HMM-16
- MTL: MTL4840, MTL4850
- Elcon: Series 2700-F
- Elcon: Series 2700-G

The supported infrastructure depends on the used multiplexer type:

Vendor	Multiplexer Type	Channels	Module Support
Pepperl+Fuchs	KFD2-HMM-16	255	no
MTL	MTL4840	0	yes
	MTL4850		
Elcon	Series 2700	32	no

Notes for Use

The HART Multiplexer software is included in the Device Management PROFIBUS and HART package and can be installed optionally. A separate license must be bought from the 800xA price list to enable HART Multiplexer Connect.

All aspects for HART device access through Multiplexer are integrated with the installation and usable when the field device type objects are instantiated.



Asset Monitors can be used only if the "Asset Optimization" option is installed and licensed in the system.

All aspects of HART Multiplexer Connect described in this section are pre-configured and must not be modified by the user if not mentioned in this manual. ABB Service must be informed before the user makes any changes to the aspects described in this document.



Limitations and restrictions of the HART Multiplexer software are described in the related Release Notes.

Additional Requirements

The operation of the HART Multiplexer Connect package requires the correct installation of the HART Server, done during installation of the Device Management PROFIBUS and HART.



The user must have Windows Administrator rights to configure the HART Multiplexer Connect. Windows Administrator rights are also needed to access online data from HART devices and to do device configuration.

Functionality

The Communication DTMs of HART Multiplexer Connect are implemented as per the FDT 1.2 (Addendum). In the following paragraphs support of specific functionality is described in more detail.

Multi User Support

The Communication DTMs supports multi-user access as per the FDT specification by using Lock/Unlock mechanism. It locks the data set, if a configuration window of the DTM is opened and release the lock after closing (shutting down) the DTM. If the instance data set is changed, all other system nodes get the changed data set distributed by the Fieldbus Builder PROFIBUS/HART.

A locked DTM can be opened in read-only mode and prevent changing configuration data.

Audit Trail

HART Multiplexer Connect with its Communication DTMs support Audit Trail session as per the FDT specification. The following are the Audit Trail events that are issued:

- Change of parameter
- Change of online state
- Call of functions

User Roles

The Communication DTMs check the user rights when an application starts up. Certain users may even be barred from using some applications. If access to an application is permitted, a distinction is made between restricted access (read-only) and full access (read and write) to its functions.

Applications	User Roles			
	Observer	Operator	Maintenance	Planning Engineer
List of HART Devices	R	R	R/W	R/W
List of Multiplexer	R	R	R/W	R/W
HART Channel Configuration	-/-	-/-	R/W	R/W
Host Selection	-/-	-/-	R/W	R/W
About	R	R	R	R

-/- = The user interface is not available for selection

R = Data output only (read)

R/W = Data input (write) and output (read)

If, in addition to the roles above, the user has administrator or OEM service rights, the role of an observer grants the user unrestricted access to all applications.

Pre-configuration

A pre-configuration have been performed before working with Multiplexer networks.

Proceed with the following steps they are described in subsections of *System 800xA Configuration (3BDS011222*)*, *Requisites and Requirements*.

- All necessary software is installed on the related system node.
- The following system extensions have been added:
 - Fieldbus Builder PROFIBUS/HART
 - HART Device Integration Library - Basis
 - HART Device Integration Library - Asset Monitoring (optional, requires Asset Optimization installation and loading of the relevant system extensions)



AC800M Connect and *AC800M High Integrity* system extensions must be loaded before loading *HART Device Integration Library - Basics* system extension.

Single Node Environment

The HART Multiplexer Connect package with its HART Server can be used in single-node configuration. Connect the HART Multiplexer hardware through serial port (for example, COM1) to this single node.



A single node environment is possible only, if no other 800xA Control Networks have been created, where the OPC Server PROFIBUS/HART is assigned and configured. Each AC 800M Control Network may contains the OPC Server PROFIBUS/HART and requires therefore its own Connectivity Server.

Multi-Node Environment

The HART Multiplexer Connect package can be used in multi-node environments. This means, that one system node is connected through serial interface to the Multiplexer, but all connected device data are distributed through the 800xA system to the clients. The HART Server is installed on the Windows 8.1 or Windows Server 2012 R2 Workstation to which the Multiplexer hardware is connected through serial port (for example, COM1).

The HART Server act as the interface between the system software and the underlying physical HART network including Multiplexers, connection panels, channels and devices. The HART Server user interface is used only to configure and manage the physical components that comprise a HART server hierarchy.

The configuration of a HART device is done inside the 800xA system through device specific DTM.

The HART Server is included in the installation routine of the Device Management PROFIBUS and HART. It needs to be running on the computer which is connected to the HART Multiplexer Network through RS232/RS485 port.

Use cases such as 800xA node does not have serial port and or to avoid Repeaters over long serial communications, requires alternatives one of such alternative is to access Serial devices over Ethernet. It is recommended to use Digi PortServer TS serial server to connect HART Server.

Digi PortServer Installation and Configuration for HART Multiplexer

For Installation and Configuration of *Digi RealPort* Server, refer to the corresponding Digi PortServer user manual.

Figure 60 shows the Digi Port Server connection for HART Multiplexer.

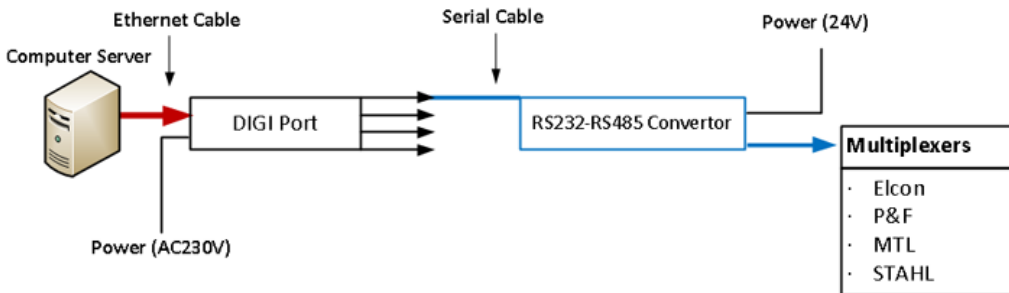


Figure 60. Digi Port Server Connection for HART Multiplexer



After Installation and Configuration of Digi Port Server, it is **recommended** to change the Digi Port optimization settings to **Latency**.

Open the Digi Port Web Server and in **Configuration > System** option select **Latency** in the Optimization drop down list.

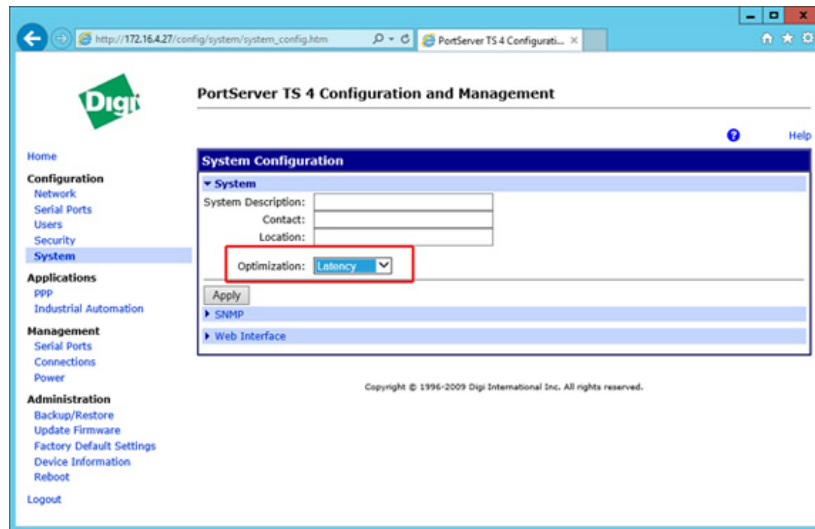


Figure 61. PortServer TS 4 - System Configuration

Reboot the Digi Port web server for the new configuration settings to be active.

Run the HART server and select the COM port that is configured in Digi Port Server for HART Multiplexer network and then make the Configuration in 800xA Plant Explorer.

HART Server Overview

The HART Server provides a user interface that is similar to the one used in Windows Explorer, so most features of the interface should be familiar. The window features are as follows:

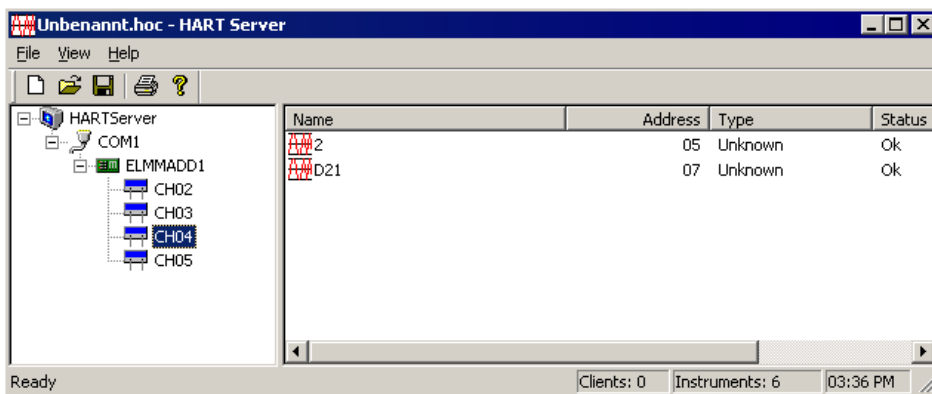


Figure 62. HART Server

The user interacts with the equipment on the networks through a tree control in the left pane and a list control in the right pane. Context menus are used to configure the network.

Tree and List Controls

The first item in the tree control is its root, the HART Server icon. This icon represents the running application. Under the HART Server icon is a hierarchical representation of the physical components the server manages (networks, Multiplexers, connection panels and channels). Just as individual files do not appear in the Windows Explorer tree control, individual instruments do not appear in the HART OPC Server tree control.

The list control displays information about the children of the selected item in the tree control. The information is shown under four columns: Name, Address, Type, and Status.

Items in the list can be sorted by name or address simply by clicking on the appropriate column heading. The width of columns is adjustable, and the column widths are saved when the server is shut down.

The following table summarizes the types of entries in the tree and list.













Tree Selection (Left Pane)	Description	Right Pane Displays
 Hart Server	The highest level of the tree control. Represents the whole system. The root node of the tree.	 Networks
 Network	Any connected network of instrumentation. Normally a serial port on the server, but, in the future, it could be a TCP/IP or other LAN connection.	 Multiplexers  Instruments Dependent upon network support
 Multiplexer	Representation of a hardware component that is attached to the network	 Panels  Channels Dependent upon network support
 Panel	Representation of a hardware component that is attached to a multiplexer.	 Channels
 Channel	Representation of a hardware component that is attached to a multiplexer or panel.	 Instruments

Figure 63. Icons in the HART Server

Detailed information are described in the HART Servers online help, accessible through help menu inside the tool.

HART Server Configuration



HART Server can be started and configured within 800xA Service Account login only. Ensure that the login user is the 800xA Service Account.

The following steps need to be carried out to configure the HART Server:

1. Login as 800xA service Account.
The service account user is described in *System 800xA Manual Installation (3BSE034678*)*.

2. Launch the hartopc.exe from: <installdrive>\Program Files(x86)\ABB Industrial IT\Engineer IT\DTM\HART Multiplexer Connect\HART Server\.

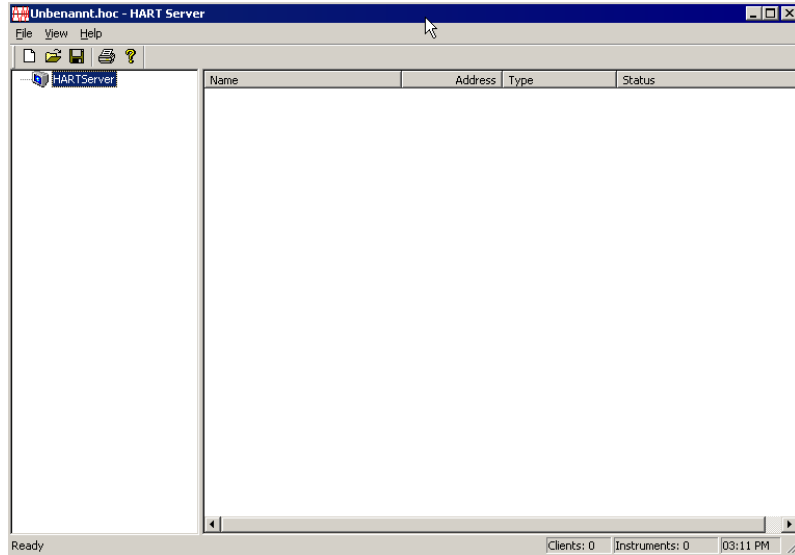


Figure 64. HART OPC Server

3. Select the Root node *HART Server*.

- Click with the right mouse button and choose *Add Network*.

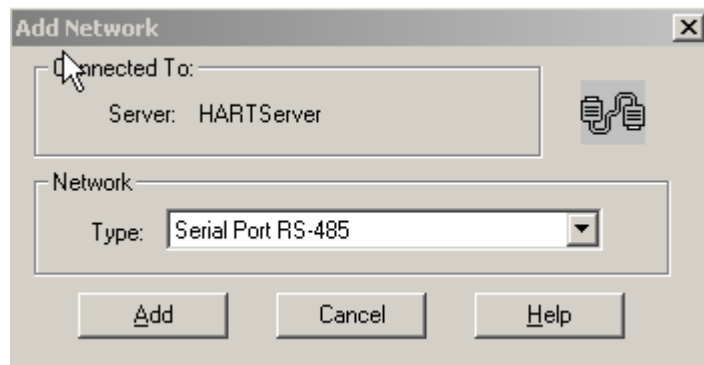


Figure 65. Add Network

- Choose one of two types of networks from the pull down menu identified as *Type*.
 - **Serial Port RS-485**
(i.e RS232 to RS485 Multiplexer Network)
Supports RS485 communication with HART Multiplexers.
 - **Single Serial Port**
(i.e RS232 connection to HART modem)
A single RS232 connection to a HART modem that supports multidrop operation.
- Click **Add**.
- Insert a network name.



This name must be included in the HART Subnet DTM, which is described in [Assignment of the HART Server to the Multiplexer DTM](#) on page 175. Keep the name in mind for later 800xA configuration.

8. Enter correct COM Port and baud rate.

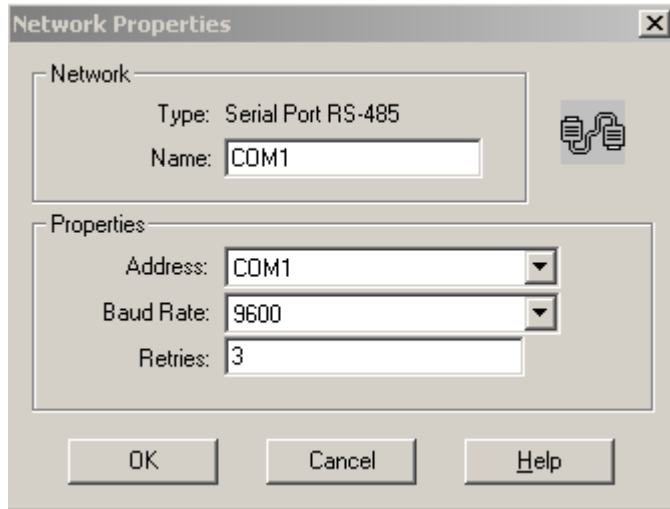


Figure 66. Network Properties



Baud rate entered in the network properties window should match with the baud rate of the multiplexer hardware and also with the baud rate of the PC port available in Windows Device Manager.

9. Click **OK**.



Steps 2 to 8 need to be repeated till all networks connected to the HART Server are configured.

The network is added to the HART Server.

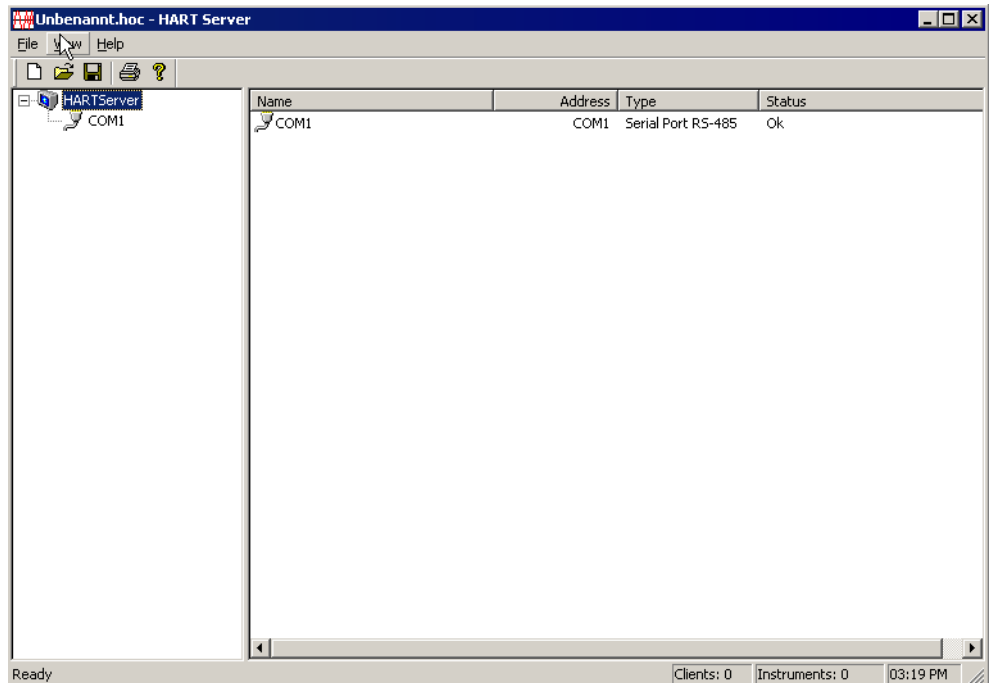


Figure 67. Network view

10. Select the new network node below the *HART Server* node.
11. Click with the right mouse button and choose *Learn*. This scans the network for the available Multiplexer and lists them.



This step is very important as the HART Mux DTM relies only on the HART Server for the connectivity to the network. If the HART Server fails to find the Multiplexer on the network the HART Mux DTM cannot work properly. Check in this case the properties of the network as well as used wiring and hardware.

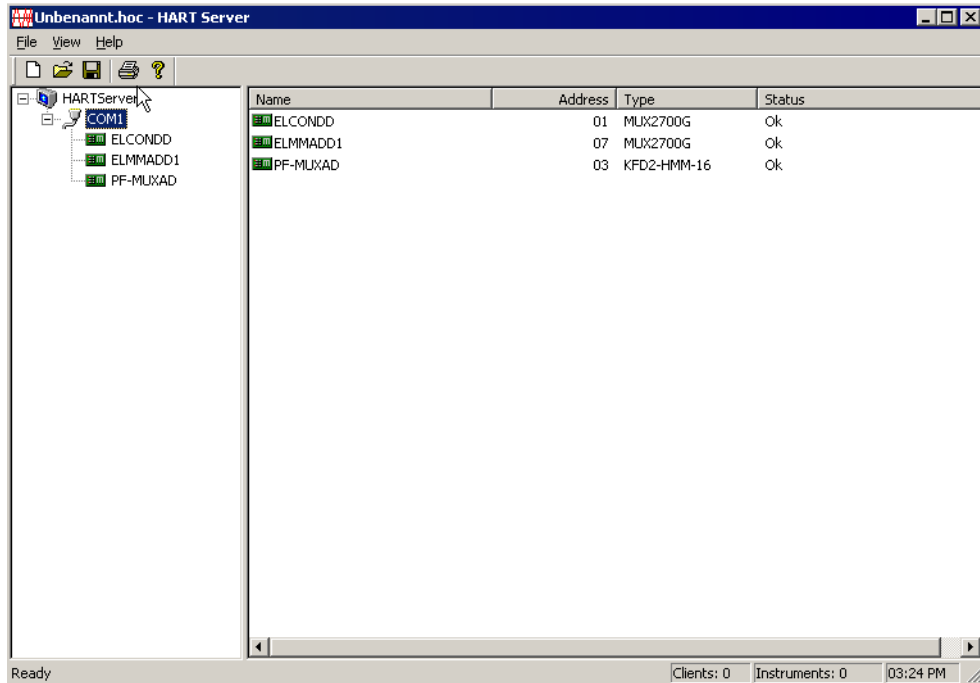


Figure 68. Scanned and found Multiplexer

The found Multiplexer can now be enquired for available devices.

12. Select a Multiplexer.
13. Click with the right mouse button and choose *Learn*. This scans the Multiplexer channels and list the devices connected.



Steps 12 to 13 shall be performed as many Multiplexer are found during learn sequence.



Errors in communication and configuration needs to be solved before going ahead with the HART Mux DTM configuration. If no Multiplexer is found in the network by the HART Server, the communication cannot be established from the 800xA system node. In this case check wiring, hardware and installation.

14. Save the configuration.

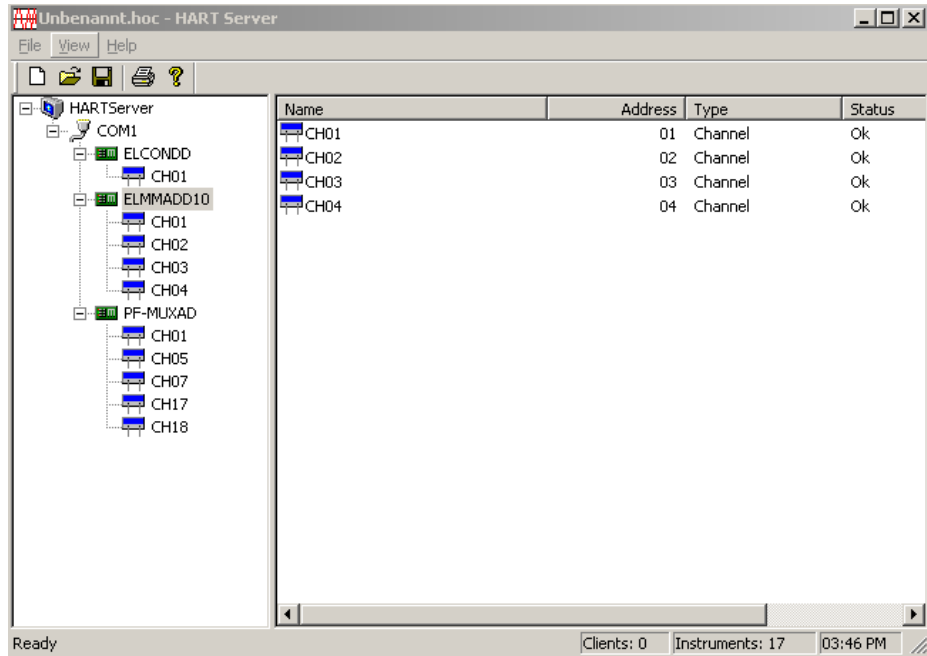


Figure 69. List of the HART device on different channels



If all configuration have been done, it is recommended to log out the 800xA Service Account user and to login as standard 800xA User, for example, Application Engineer.

800xA System Configuration

For Device Management into 800xA system the relevant objects need to be available in the *Object Type Structure* of the Plant Explorer. The objects are delivered along with the Device Management PROFIBUS and HART setup.

After successful adding the required system extensions a new Object Type Group *HART Multiplexer* is created in the *Object Type Structure* of the Plant Explorer.

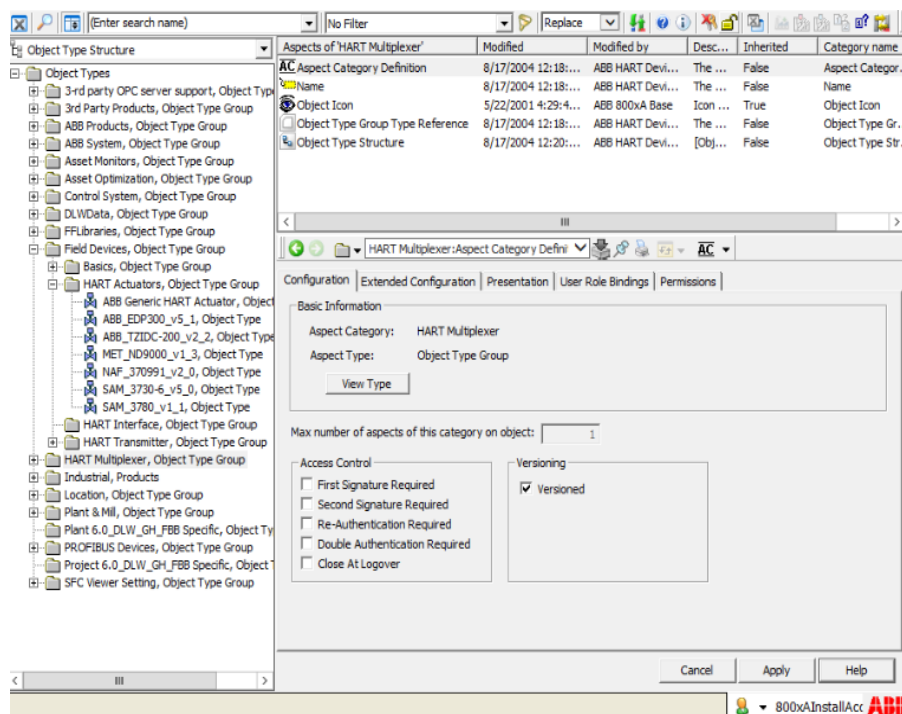


Figure 70. Multiplexer object in the Object Type Structure



All configuration steps described now must be done in Communication disabled mode, if not described in a different way. Communication modes are described in *System 800xA Configuration (3BDS011222*)*.

Create a new HART Multiplexer Network

The following steps need to be carried out:

1. Open *Control Structure* in the Plant Explorer.
2. Select the **Root** node.
3. Right-click on the mouse and select **New Object**.

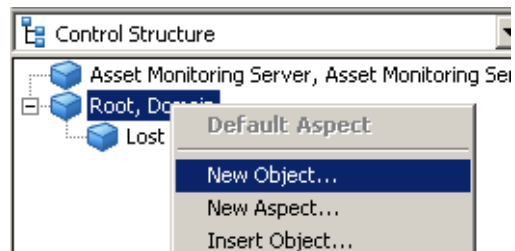


Figure 71. Select New Object...

4. Browse to **Object Types > HART Multiplexer > HART Multiplexer Network**

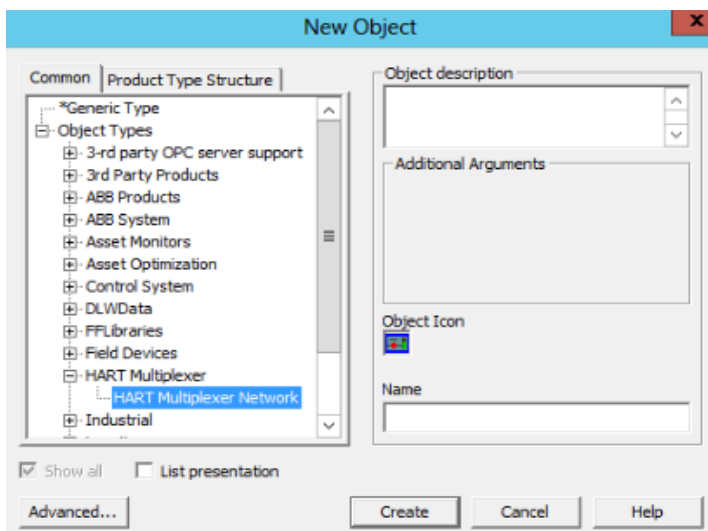


Figure 72. Adding a new HART Multiplexer Network

5. Insert an object name and click **Create**.

Two objects *HART Multiplexer Network* and *HART Multiplexer Subnet* are automatically created below the root node.

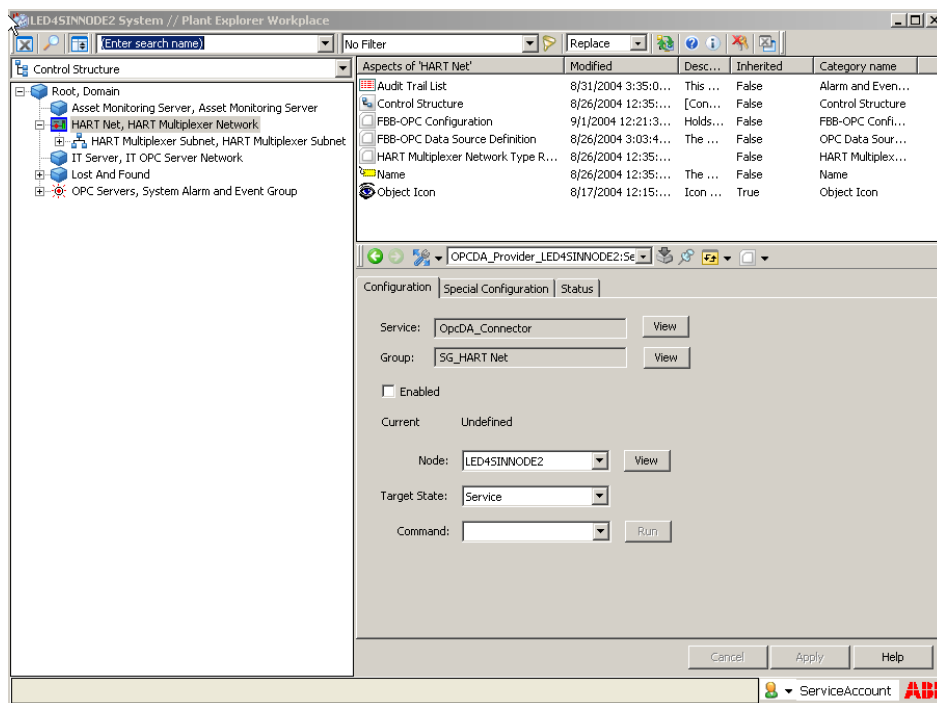


Figure 73. The Mux Objects in the Control Structure



It is possible to create more than one HART Multiplexer Network. Each Control Network is assigned to a single OPC Server, used in the 800xA system. Furthermore each HART Multiplexer Network is related to a single HART Server on a separate PC.

The following steps have to be performed for each HART Multiplexer Network.

Assignment of the OPC Server PROFIBUS/HART to a Connectivity Server

A Connectivity Server on which the OPC Server PROFIBUS/HART can be executed is assigned to each HART Multiplexer Network.



Only one OPC Server PROFIBUS/HART can be started per Connectivity Server. OPC Servers for other software options, for example the HART Server, can also be executed on the same Connectivity Servers.

1. Select the HART Multiplexer Network.

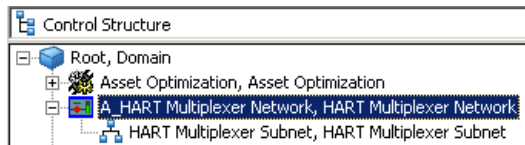


Figure 74. HART Multiplexer Network



The following steps should be carried out for each HART Multiplexer Network which is placed in the system and contains the *FBB-OPC Data Source Definition* Aspect.

2. Select *FBB-OPC Data Source Definition* aspect.

3. Select the *Connectivity* tab.

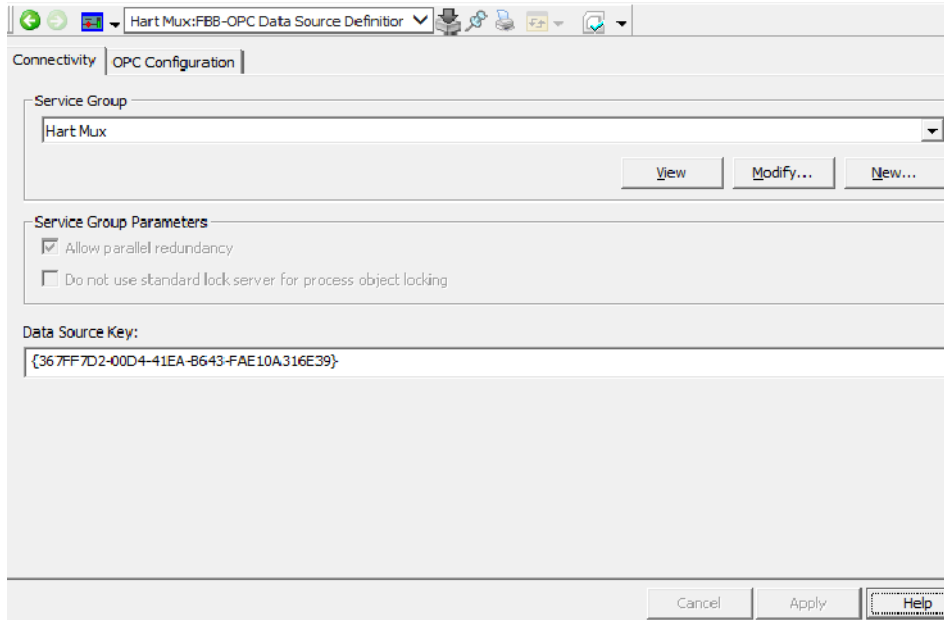


Figure 75. Connectivity tab

4. Click **New**.

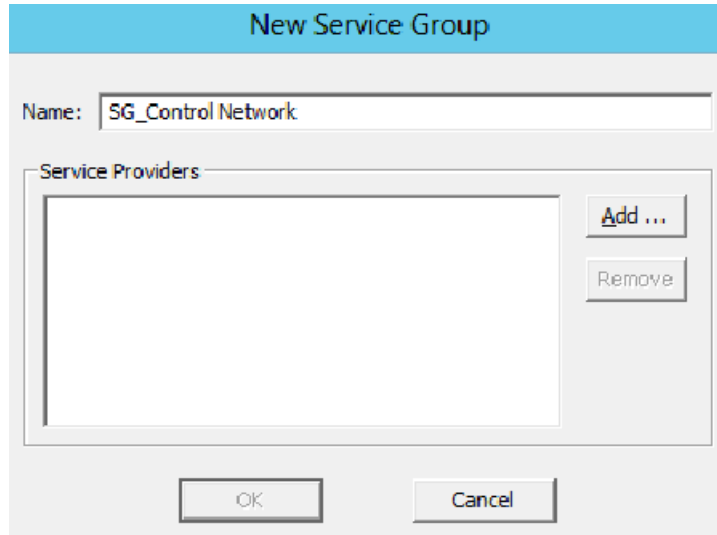


Figure 76. New Service Group

5. Change the name of the service group, if required.



The service group name can be found under *Service Structure -> Services -> OpcDA_Connector*.

The name entered here improves the structure for the user.

Example of a service group name: *FBB_OPC_MUXnetwork1*



Each control network needs a unique service group name and shall not given twice in the system.

6. Click **Add**.

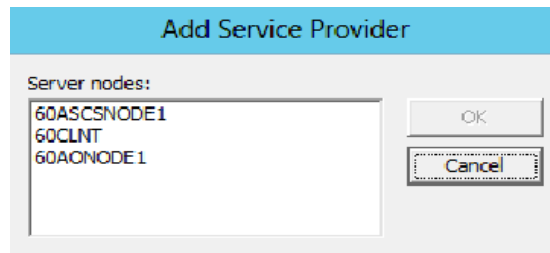


Figure 77. Adding a service provider

7. Select the Connectivity Server on which the OPC Server PROFIBUS/HART is installed and running.

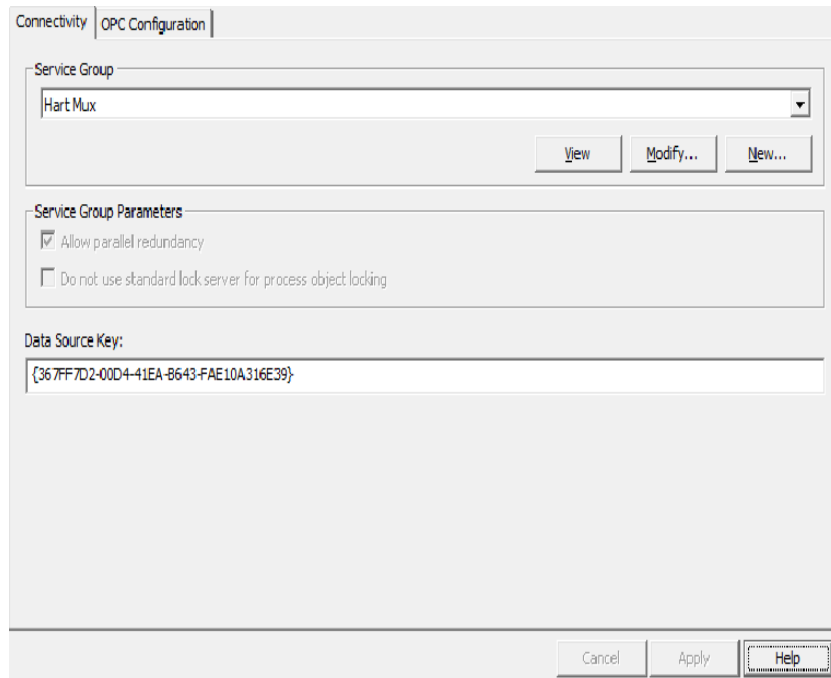


Figure 78. OPC Server configuration complete

8. Click the **OK** button in the main window.

The OPC Server is now configured for data access to device-internal data through OPC communication.



If redundant Connectivity Servers are used in the system then they need to be assigned to the same Control Network. To do this, repeat steps 1 to 8 for each redundant Connectivity Server.



In cases where more than just one Control Network is instanced, steps 1 to 8 are also repeated for these Control Networks.

Different service group names **and** different Connectivity Servers must be used.

Assignment of the HART Server to the Multiplexer DTM

1. Open *Control Structure* in the Plant Explorer.
2. Select the HART Multiplexer Subnet.

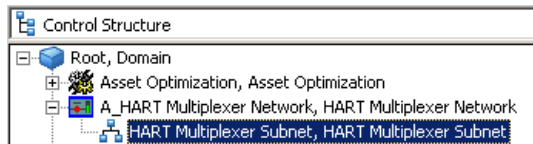


Figure 79. HART Multiplexer Subnet

3. Select the Aspect **Device Management** and invoke in the opened HART Subnet DTM **OPC Server configuration**.

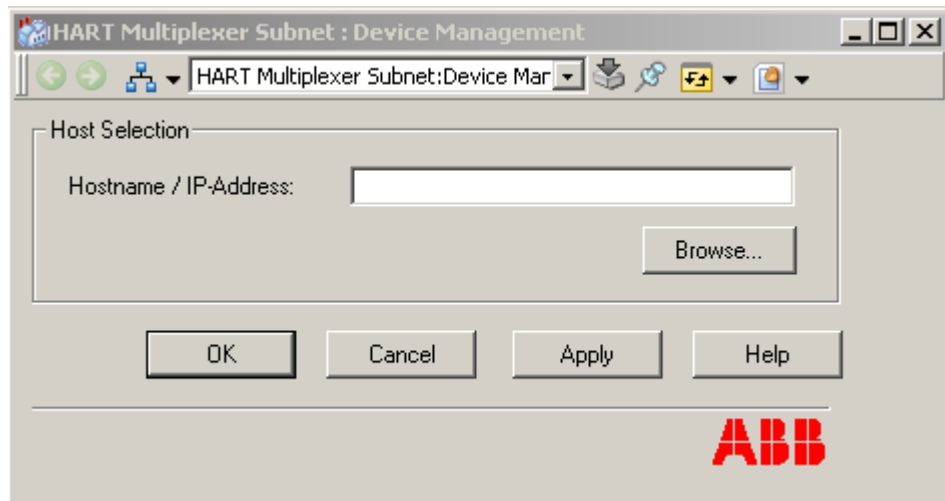


Figure 80. Specify the HART Server address

4. Insert the IP Address of the system node, where the HART Server shall be executed (node with the connected Multiplexer hardware).



It is not allowed to insert “localhost” or the IP “127.0.0.1” as a local host name.

5. Invoke in the HART Subnet DTM *Channel Configuration*.

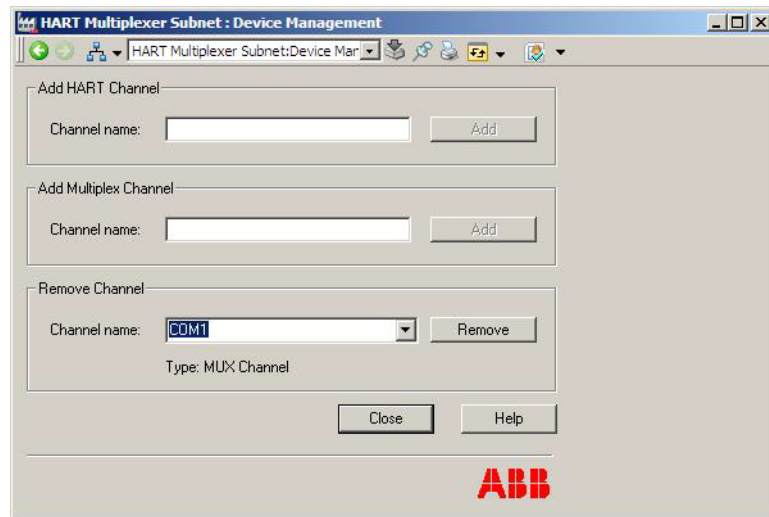


Figure 81. Channel Configuration

6. Insert the channel name, configured in the HART Server.



The HART Subnet DTM is pre-configured with a channel name for the different Multiplexer types. The default channel name is *COM1*. If additional or other channel names are used, these have to be included in this DTM Window. The channel name is already configured in the HART Server as network name and is described in [HART Server Configuration](#) on page 159.

7. Click **Add**.



Repeat steps 5 to 6 till all channel names are configured. The channel names not included in the channel configuration cannot access the physical HART Multiplexer in later configuration work.

8. Click **Close**.

The button **Add** is relabeled according to the selected channel name. If the channel does not exist, the button is labeled *Add* and if the channel does exist, the button is labeled *Remove*.

If it is not possible to edit the list of channels, the button is disabled. This is the case if the channel that is currently displayed in the edit field has already assigned a communication DTM.

Instantiation of HART Multiplexer Objects

The following steps have been performed on the HART Multiplexer Subnet to establish the communication between 800xA device type objects and the physically existing device through Multiplexer hardware.



Instantiation of HART Multiplexer Objects has to be done in Communication disabled mode.

1. Open *Control Structure* in the Plant Explorer.
2. Select the HART Multiplexer Subnet.
3. Right-click on the mouse and select *New Object*.

4. Select the used Multiplexer hardware from the list.

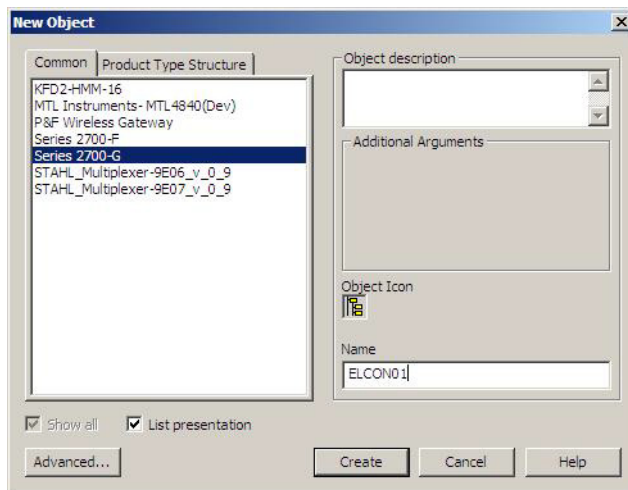


Figure 82. HART Multiplexer Objects in the 800xA system

5. Insert a name and click **Create**.



Each HART Multiplexer object needs a unique name and shall not be given twice in the HART Multiplexer Network.

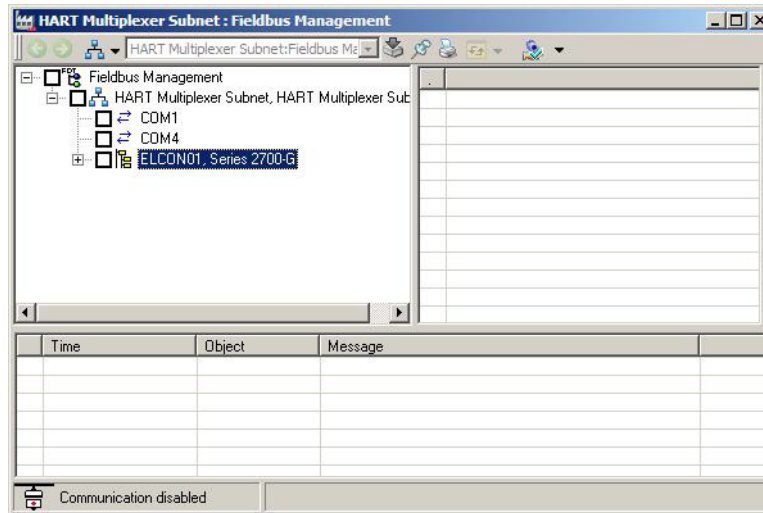


Figure 83.

6. Drag and drop newly created Multiplexer to the required channel.



The choose name does not need to match with any previous configuration. Repeat steps 1 to 6 till all used Multiplexer are instantiated.

Scanning for Multiplexer Hardware



Scanning of HART Multiplexer Objects has to be done in Communication enabled mode and the HART Server window must be closed. If the channel name of HART Subnet DTM and the network name of HART Server are different from default name COM1, the correct channel name needs to be entered in the column channel.

1. Open *Control Structure* in the Plant Explorer.
2. Select the HART Multiplexer Subnet.

3. Select *Device Management* aspect and invoke *List of Multiplexer*.

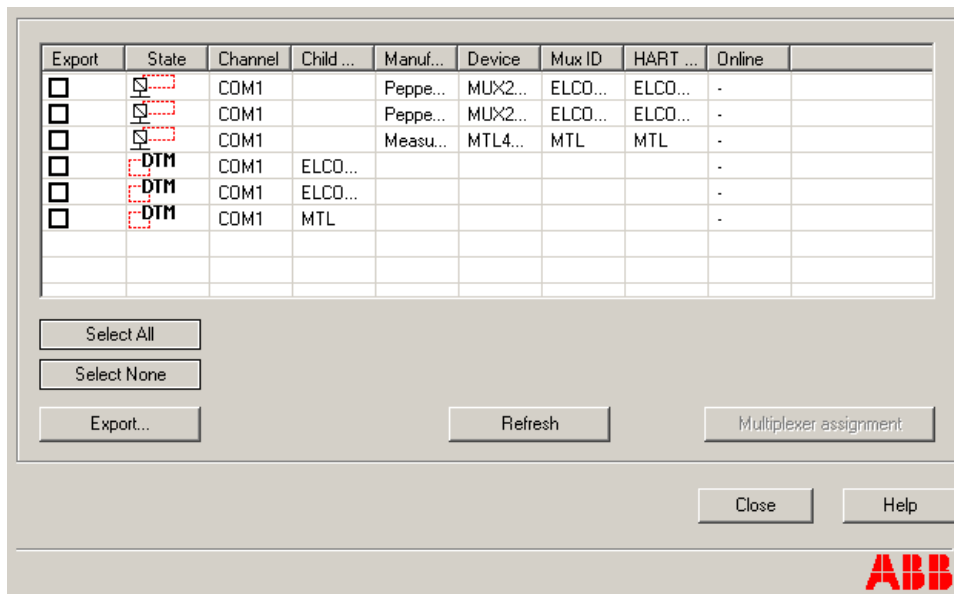


Figure 84. List of Multiplexer

4. Click **Refresh**.

The list view shows the instantiated Multiplexer objects and the physically existing Multiplexer hardware, found during scan procedure of the HART Server.






Instantiation of Multiplexer objects can also be done with bulk data process, described in [Section 9, Bulk Data Management](#).

List of Multiplexer

The HART Subnet DTM with its *List of Multiplexer* window provides information about instantiated Multiplexer objects and physically existing Multiplexer hardware (vendor, type, channel information), connected to the RS485/RS232 networks.

The *State* field is used to display an icon, that reflects the state of device configuration. The following icons are possible.

Table 13. Icons, used in List of Multiplexer

Icon	Content
	This icon represents an instantiated Multiplexer object in the 800xA system, which is not associated to any physically existing Multiplexer.
	This icon represents a physically existing Multiplexer, identified from the HART Server during network scan.
	This icon represents an instantiated Multiplexer object, which is configured and assigned to an physically existing Multiplexer.

The **Refresh** button allows to update the list by scanning the network for physical Multiplexer hardware, connected to the HART Server. While the refresh process is active, this button is labeled *Stop Refresh* and all other buttons are disabled. Selecting *Stop Refresh* cancels the refresh process.

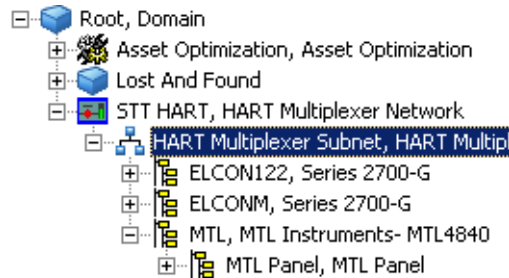
The button **Multiplexer assignment** is only available if the DTM is in offline mode (Communication disabled) and exactly one Multiplexer object is selected in the list. This button will open a separate dialog, which allows the assignment of the instantiated Multiplexer object and the physically existing Multiplexer hardware.

The **Export** field in the list allows a selection of rows to export information. If the **Export** button is selected, the information about the selected entries are exported in a file. If no check box of the list is checked the **Export** button is disabled. It is recommend to use a *.csv or *.xls file extension for export.

Assignment of the Multiplexer Object to the Multiplexer Hardware.



The Multiplexer hardware from MTL does not support different channels, but it supports instead different panels. During instantiation of the MTL Multiplexer object automatically a panel is created below the MTL Multiplexer object. If more than one panel is physically to be used, select the MTL Multiplexer object, right mouse click and create a new panel object. Repeat these steps until all panels are instantiated.



Assign the certain panel to the Multiplexer panel object as described in this section. A channel configuration for the MTL panels is not required and can be skipped. Continue after Hardware/Object assignment with [Scanning HART Devices](#) on page 188.



Assignment of the Multiplexer Object has to be done in **Communication disabled** mode.

1. Select the Multiplexer object, which shall be assigned to a physically existing Multiplexer hardware.



Multiplexer objects, which are not assigned to Multiplexer hardware, are shown in the state column as



2. Click **Multiplexer assignment**.

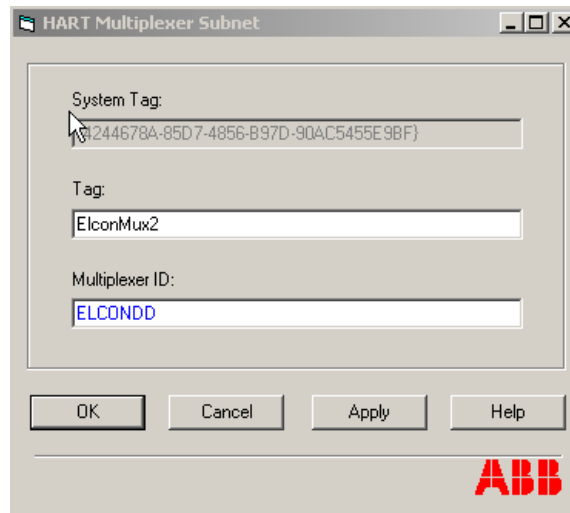


Figure 85. Assigning of the Multiplexer object to the hardware

3. Insert the *TAG* of the Multiplexer.
4. Insert the same Multiplexer ID, representing the connected Multiplexer hardware.



The Multiplexer ID is shown in the *List of Multiplexer* DTM window in the column *Mux ID* as shown in [Figure 84](#).

- Click **OK**.

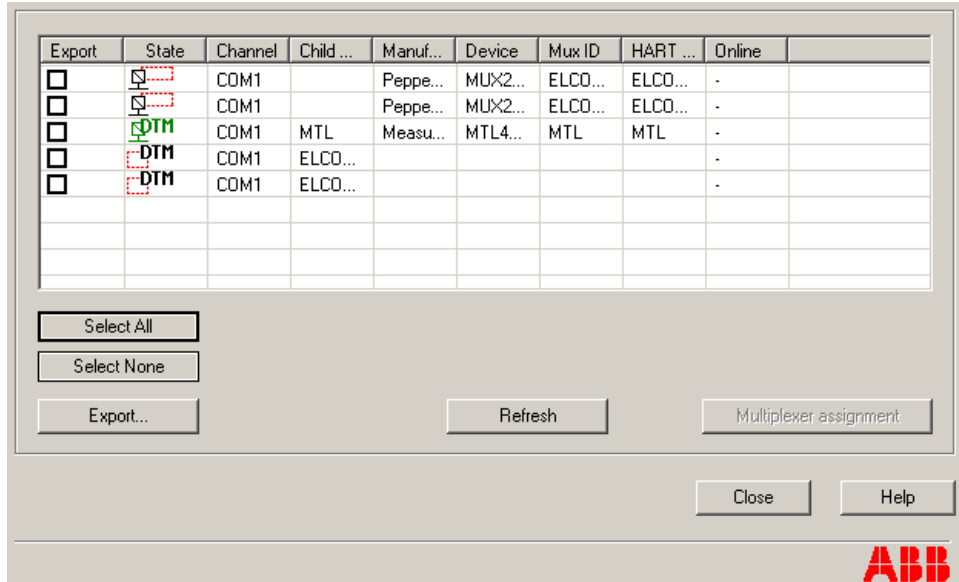


Figure 86. Assigned object to the Multiplexer hardware

If a 800xA object matches to the physical hardware type, only one entry will be visible for the Multiplexer object and the hardware. The icon of that entry will be green.



Repeat steps 1 to 5 till all requested Multiplexer hardware is assigned to certain object in the 800xA system.

Multiplexer Channel Configuration

Perform the following steps to configure Multiplexer channel:



It is mandatory to remove the Multiplexer channels that are not connected to physical HART device. To Add or Remove channels refer to [Add new Channels](#) on page 187 and [Remove Channels](#) on page 187.



Channel configuration optimizes the performance of the Multiplexer scan rate. Therefore only the physically used channels shall be configured.

1. Open *Control Structure* in the Plant Explorer.
2. Select the Multiplexer object.

3. Select **Device Management** aspect and invoke *HART Channel Configuration*.

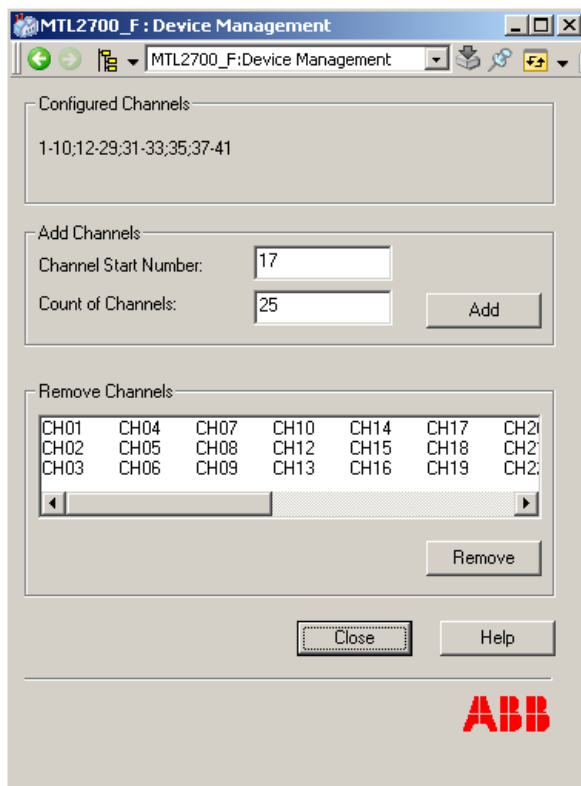


Figure 87. HART Channel Configuration

The currently used and configured channels are shown in the frame *Configured Channels*. Channels, which are used from the Multiplexer hardware and not shown in this frame, can be inserted by using the frame *Add Channels*.

The channel are constructed as *CHxx* object name in *Control Structure* of the Plant Explorer, whereas *xx* is the number of the specific channel.



The following steps need to be carried out, if channels are missed or shall be removed in the current configuration.

Add new Channels

The frame *Add Channels* allows to add further used channels of the Multiplexer, which are not configured yet.

1. Insert the *Channel Start Number* of the channels, which shall be added to the configuration.

Channel Start Number allows to define the first missed channel of the Multiplexer hardware.



Example:

The first missed channel is number 17. Enter number 17 in the name box.

2. Insert the increment number of channels in the field *Count of Channels*.

The entered number in the *Count of Channels* field is the amount of used channels.



Example:

The first missed channel is number 17. The last missed channel is number 19. Enter the number 3 in the *Count of Channels* field. Channel 17, 18 and 19 are added to the configuration.

Remove Channels

The frame *Remove Channels* allows to delete those channels, which are not used from the Multiplexer hardware. Multiple selection is possible. Clicking the **Remove** button results in deleting the selected channels.



The add and remove functionality of the *HART Channel Configuration* window is write protected if HART devices are already associated to any HART channel of the Multiplexer object or if the HART Multiplexer network is in **Communication enabled** mode.

A channel configuration is not possible till all inserted device objects below the Multiplexer object are deleted.

Check configured channels

1. Open *Control Structure* in the Plant Explorer.
2. Select the **Fieldbus Management** aspect of the Multiplexer object.

3. Open the tree in the Fieldbus Management window.

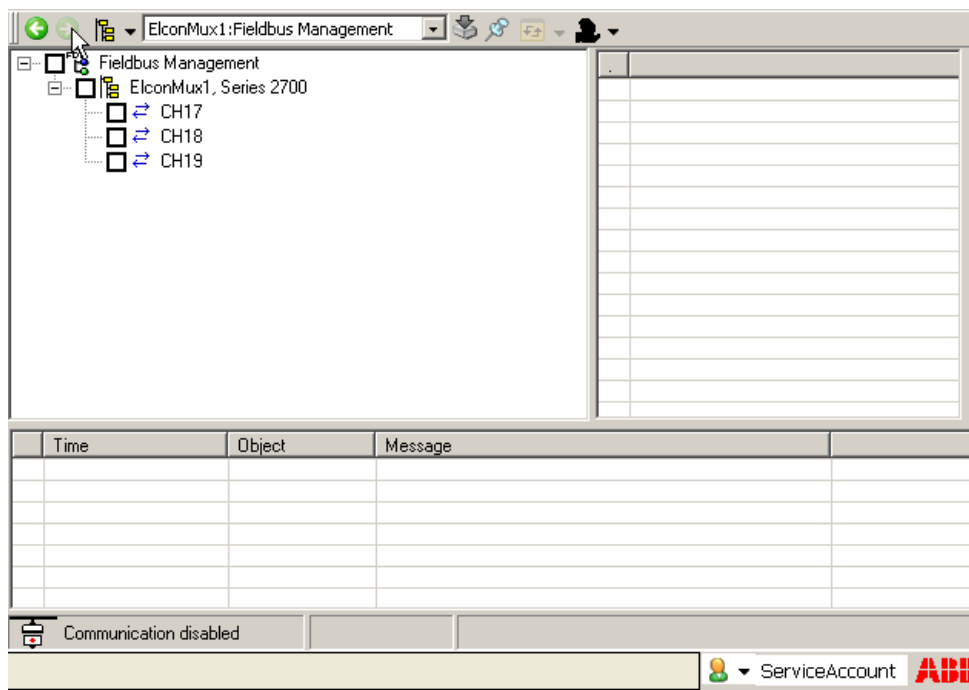


Figure 88. Configured HART Channels

Configured channels shall be visible in the Fieldbus Management tree below the Multiplexer object.



Repeat the procedure described in [Multiplexer Channel Configuration](#) on page 185 for each instantiated Multiplexer object.

Scanning HART Devices.



Scanning of HART Devices has to be done in Communication disabled mode.

1. Select the Multiplexer object.

2. Select **Device Management** aspect of the Multiplexer object and invoke *List of HART Devices*.
3. Click **Refresh**.

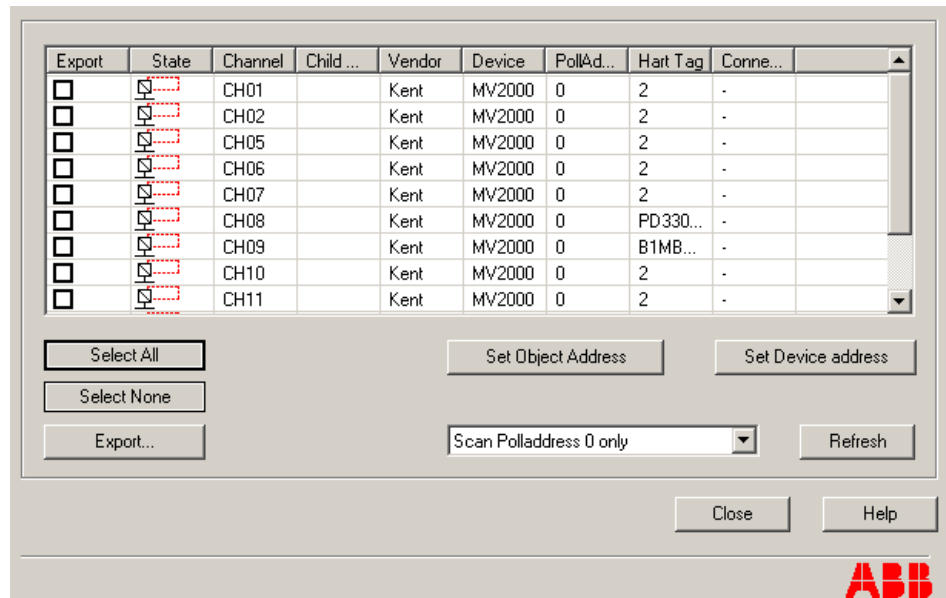


Figure 89. List of HART devices

The physically existing devices are shown in the list. The displayed devices must be configured manually in *Control Structure* of the Plant Explorer. Therefore it is essential to keep the list in mind for configuration.



The pages below gives detailed information of the *List of HART Devices* window. Start device object instantiation and configuration [on page 193](#).






Instantiation of device objects can also be done through bulk data process, which is described in [Section 9, Bulk Data Management](#).

List of HART Devices

The specific Multiplexer DTM provides information about HART devices (vendor, type, channel information) that are connected to HART channels of the selected Multiplexer.

If the Multiplexer DTM is called in an offline mode, the *List of HART Devices* as shown in [Figure 89](#) provides a list of found devices. The *State* field is used to display an icon, that reflects the state of device configuration. The following icons are possible:

Table 14. Icons, used in List of Multiplexer

Icon	Content
	<p>This icon represents an instantiated device object in the 800xA system, which is not associated to any physically existing HART device.</p> <p>This icon only appears, if more than one HART device is configured in <i>Control Structure</i> of the Plant Explorer to a specific channel, supporting multi-drop mode.</p> <p>For changing the polling address of the specific object, use the Set Object address button.</p>
	<p>This icon represents an physically existing HART device, identified from the HART Server during device scan (refresh).</p> <p>Changing the polling address of the physical device hardware use the Set Device address button.</p>
	<p>This icon represents an instantiated device object, which is configured and assigned to an physically existing HART device.</p>

The **Refresh** button allows to update the list by scanning the Multiplexer for physical device hardware. While the refresh process is active, this button is labeled *Stop Refresh* and all other buttons are disabled.

Selecting *Stop Refresh* cancels the refresh process.

The **Set Object address** button is only available if the Multiplexer DTM is in offline mode (Communication disabled). One device object is selected in from the list, which shall be assigned to a multi-drop address.



Device objects are shown in the state column as



Set Object address button will open a separate dialog for setting the Address/Tag of the HART device object. The entered address is not synchronized with the physically existing device hardware.

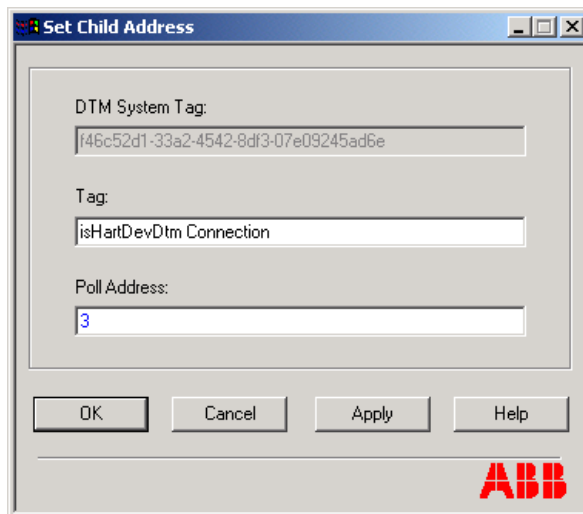


Figure 90. Set Object polling address and TAG



Changing the HART address of the physically existing device hardware is done through **Set Device address** button in the *List of HART Devices* window.

The **Set Device address** button is only available if the DTM is in online mode (Communication enabled). One physical HART device is selected from the list, which shall be set to a poll address.



Physical HART devices are shown in the state column as



Set Device address button will open a separate dialog for setting the poll address of the physical HART device. The entered address is not synchronized with the device object.

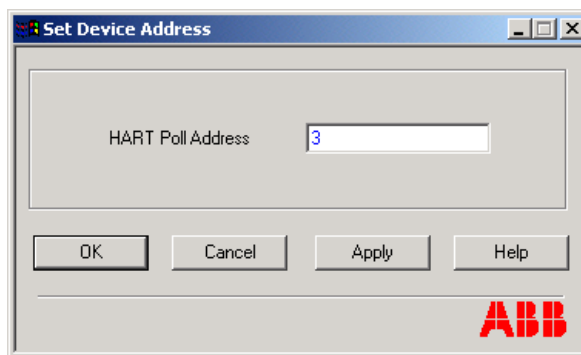


Figure 91. Set Device address



Changing the address of the device object is done through **Set Object address** button in the *List of HART Devices* window.

The **Export** field in the list allows a selection of rows for export information. If the **Export** button is selected, the information about the selected entries are exported in an excel file. If no check box of the list is checked the **Export** button is disabled. It is recommend to use a *.csv or *.xls file extension for export.

Use **Select all** button, if the export file shall contain the complete list of HART devices as shown in the window. All devices and objects are checked for export.

The **Deselect all** button removes all check marks of the selected objects.

There is a combo box for choosing the kind of scanning. Either only address 0 is scanned or the channels are polled from 0 to 15.

Instantiating HART devices

For each scanned device an appropriate HART device object must be instantiated in *Control Structure* of the Plant Explorer. The *List of HART Devices* shows these devices with information about vendor, device type and the connected channel.



Select all objects in the *List of HART Devices* window and start an export. Use the export file (for example, excel) to have the device information to be on hand for next steps.

The *Object Type Structure* provides device object types for corresponding device types, connected to the Multiplexer hardware.

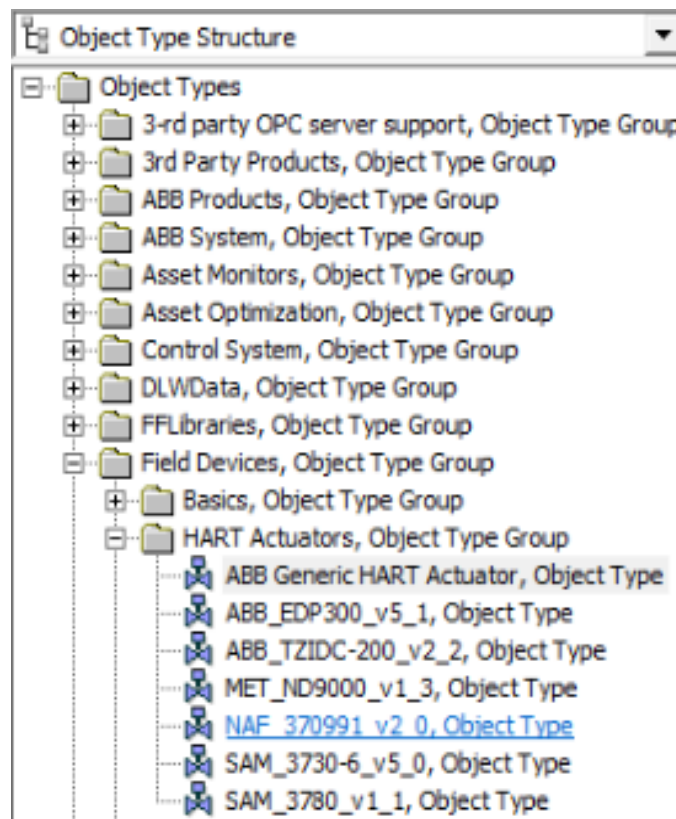


Figure 92. HART object types



For HART, object types are stored inside the **Object Types > Field Devices** catalog.

The object types in the *Basics, Object Type Group* catalog are generic object types, which are not designed for direct use.

Use device types from *HART Actuators* and *HART Transmitter Object Type Groups* instead.



Vendor specific DTMs sometimes include a license mechanism to run the DTM without limitations. Only the DTM software is part of the Device Management PROFIBUS and HART Package. Specific license for DTMs are not part of the Device Management PROFIBUS and HART Package. The DTM license has to be ordered separately from the DTM vendor. Licenses for a DTM are not included in the 800xA licensing.



Creating HART device object instances in the Plant Explorer is only possible in **Communication disabled** mode. Refer to *System 800xA Configuration (3BDS011222*)* for more details.

1. Open *Control Structure* in the Plant Explorer.
2. Select the Multiplexer object below which the HART device object will be placed, for example, Elcon's *Series 2700*.
3. Click with the right mouse button to open the context menu.

4. Select **New Object** in the context menu.

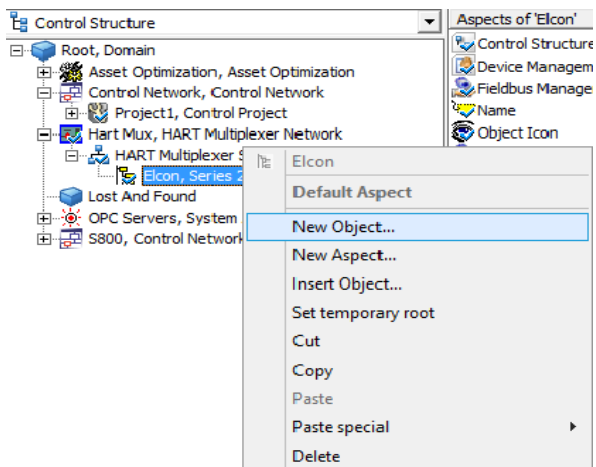


Figure 93. Creating a new device object

5. Open the Field Device folder in the object types window and select the required device object.



If the required device object is not available in the device object list, the generic HART object can be used.

6. Enter a name for the specific device in the Name box, for example, the TAG.

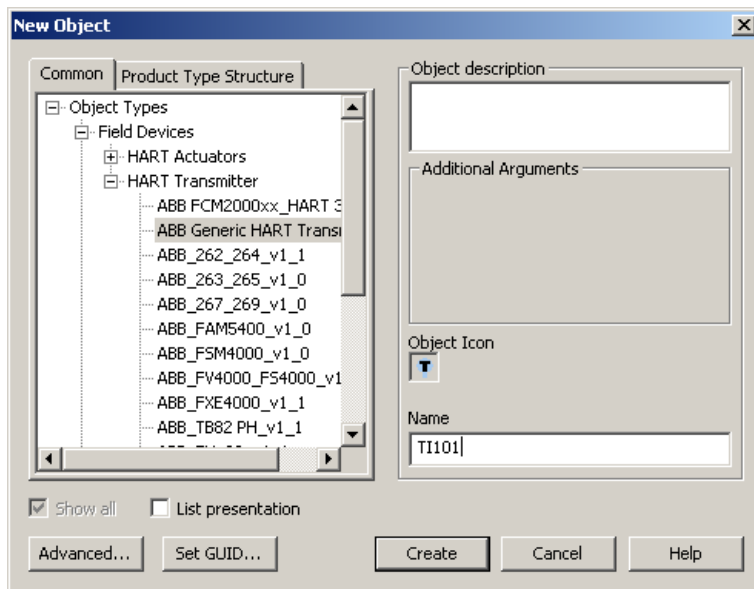


Figure 94. Selecting a device object

7. Click **Create**.

The new device object is placed below the Multiplexer object. Repeat steps 2 to 7 until all of the desired device objects have been placed on the Multiplexer object. All scanned devices, in the *List of HART Devices* window shown in [Figure 89](#), shall be instantiated.

Channel allocation on Multiplexer object

The following operations must be carried out to assign the HART device objects to the Multiplexer channels:

1. Open *Control Structure* in the Plant Explorer.
2. Select the **Fieldbus Management** aspect on the Multiplexer object type, for example, Elcon's *Series 2700*.
3. The Fieldbus Builder PROFIBUS/HART copies the fieldbus tree from the *Control Structure* to its fieldbus tree in the main window. To improve performance levels, the partial tree is not copied entirely.
4. Click "+" to open the next level of the partial tree.
5. All positioned field devices, together with the channel information from the Multiplexer objects, now appear in the partial tree.



If some devices are deleted from HART Server Configuration, then remove the corresponding device instances in 800xA. In any case make sure that 800xA Device Management and Asset Optimization does not try to read device data from HART server for which HART server does not have configuration.

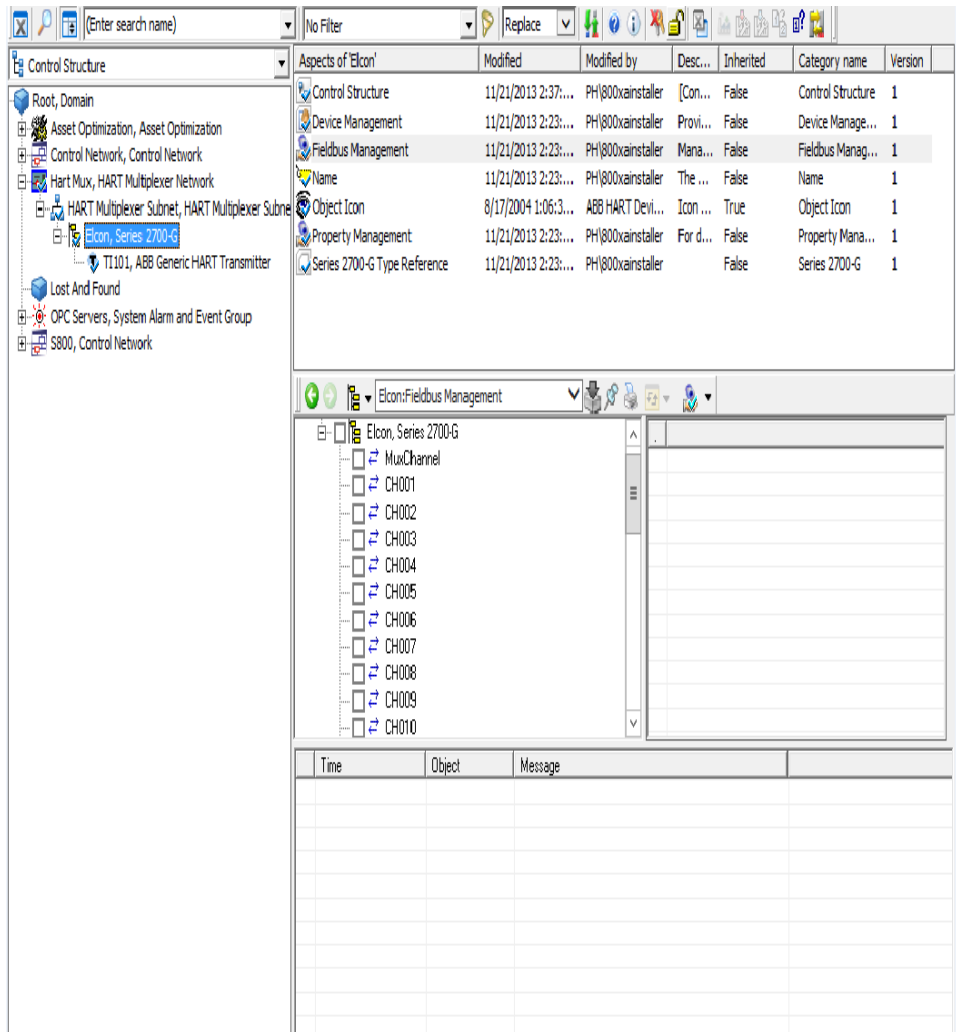


Figure 95. Fieldbus Management view

- The field device is selected and moved to the required channel by pressing and holding down the mouse button (drag and drop). The field device automatically moves to the channel.

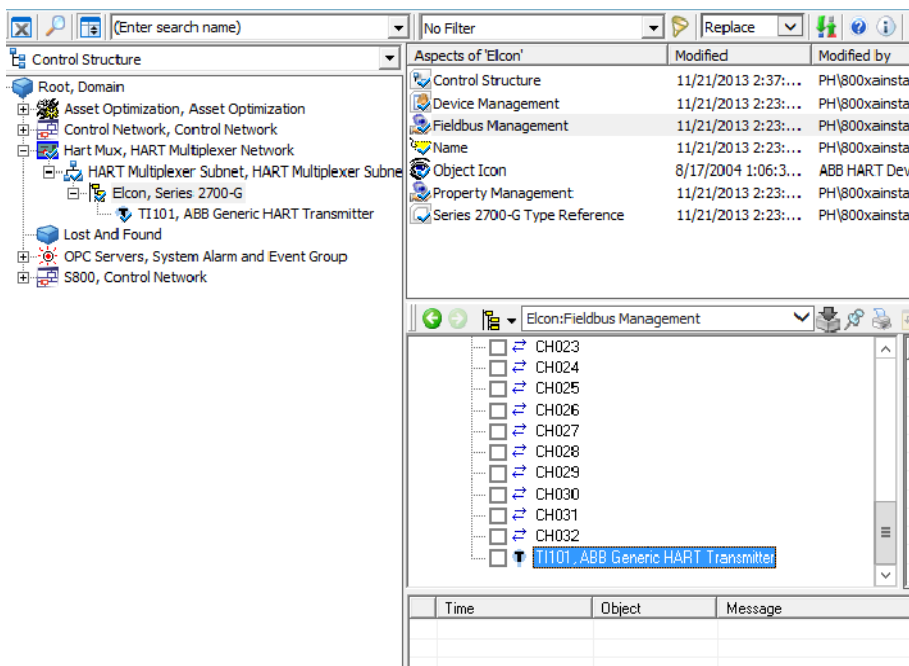


Figure 96. Assigned devices on Multiplexer channel

- If the check box next to the device object is selected, the status window is updated and the object information is displayed.

This completes the Multiplexer channel configuration for the HART Mux DTM. Repeat [Step 2](#) to [Step 7](#) until all of the desired device objects have been placed on the right Multiplexer channel.

Use the **List of HART Devices** window on the Multiplexer object to check if all device objects are instantiated and assigned to the right Multiplexer channel.

- Select the Multiplexer object.

9. Select *Device Management* aspect of the Multiplexer object and invoke *List of HART Devices*.
10. Click **Refresh**.

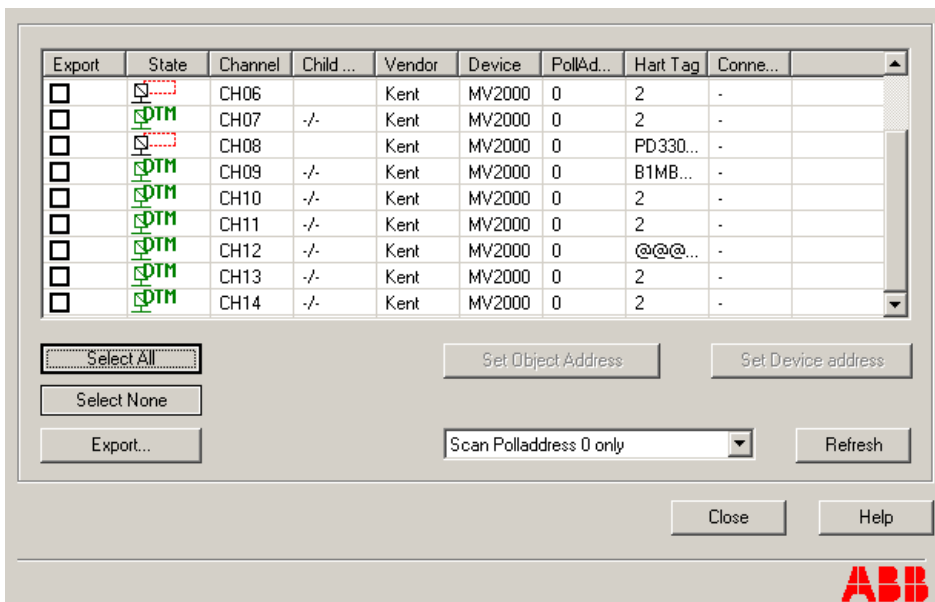


Figure 97. List of HART devices

If the device object matches to the physically existing HART device, only one entry will be shown for the HART device. Correct configured device objects are indicated with green DTM sign. Device types that are not configured need to be configured as described in the steps above.

The configuration is now done for the Multiplexer and the device objects. Perform the following steps as described in subsection Starting the DTM and Starting OPC Server PROFIBUS/HART in *System 800xA Configuration (3BDS011222*)*. Execute the steps in subsection Starting OPC Server PROFIBUS/HART instead of step 4. Select a master object (for example, ModuleBus, CI854) in the *Control*

Structure. Select the Multiplexer object. Proceed with [Step 5](#).



Do not access HART server simultaneously from 800xA and HART Server User Interface.

Before opening HART Server User interface make sure HART server is not accessed by DTMs and Asset Optimization in 800xA.

All DTMs must be switched back to Offline mode and Service for PROFIBUS/HART OPC Server must be stopped in *Service Structure*.

After working with HART User Interface, close the user interface before data is accessed by 800xA services such as online DTMs and PROFIBUS/HART OPC server.

Section 8 WirelessHART in 800xA System

WirelessHART connectivity is used in 800xA System. This functionality enables communication between WirelessHART devices or Wired HART devices through an adapter to the 800xA system.

The connection between wireless devices and 800xA system is achieved by Pepperl+Fuchs WirelessHART Gateway through Modbus TCP.



WirelessHART connectivity to the 800xA system is a managed release with reduced functionality. This means an approval from product management is required before it can be used.



For detailed information on Pepperl+Fuchs WirelessHART Gateway, refer to Pepperl+Fuchs website.

For detailed information on wireless Adapters, refer to corresponding vendor's website.

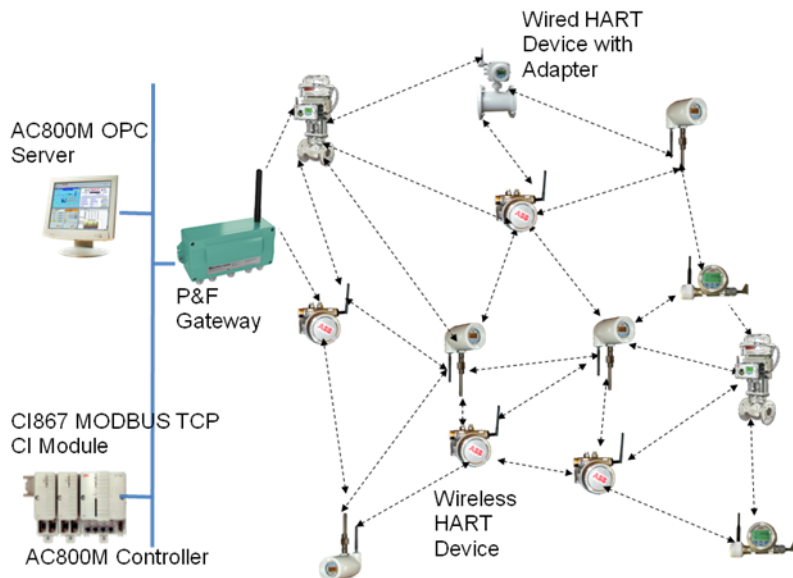


Figure 98. WirelessHART Topology

WirelessHART Mesh Network Guideline

Superior performance, security, reliability and robustness are the important characteristics required for an efficient WirelessHART network. In order to achieve these characteristics, follow the below mentioned thumb rules of network planning and design:

1. Plan the wireless network by obtaining or creating a scaled drawing of the process unit or area where the network will be installed. Within the selected area, identify the measurement points that satisfy current and future application needs. After completing the scaled drawing decide the wireless device locations using rule of thumbs as mentioned in the next step.
2. After the device locations are identified, select a location for the wireless Gateway that:

- a. Provides easy access to power supply for the Gateway.
 - b. Is convenient for the physical (or possibly wireless) connection to the host system.
 - c. Ideally provides a direct wireless connection (without a "hop") to 25% of the wireless devices in the network. Even for the smallest networks, have at least two devices that communicate directly with the gateway.
3. First, install the Gateway. Then install other WirelessHART devices. Also, the location of future devices need to be considered which may get connected to the wireless network. Gateway should be installed outdoors at least 1m above the neighboring structures, such as on the top of control room. If outdoor mounting is not possible, then the gateway can be connected to a remote antenna using a 6 meters cable.
 4. Device Installation Rules:



- Observe current and voltage limitations for wireless and wired devices. Refer to device data sheet. Specially, in case of an Analog Output device (Positioner) connected to an Adapter directly via 24V DC power supply, connect a proper series resistance (~ 800 to 1000 Ohm) to limit the current to a safe value.
- When signal is disrupted consider repositioning or putting additional device to create alternate communication path.
 - When there is an obstacle, consider mounting the device to the edge of the obstacles so that waves can bend around it. Also, it is good to install wireless device 1.5 meter above the ground or floor level.
 - Always keep the device's antenna vertical. Also, antenna can be turned in a way that nearby device or Gateway gets maximum signal range.
 - Make sure there are at least 3 neighbors for each WirelessHART device. Also, do not position wireless devices directly below or above each other.
 - Install devices at least 1 meter distance from each other.
 - There should be as little metal around the device as possible. Try positioning devices at least 30 cm away from metal surfaces, pipes and walls containing metal.
 - Do not install devices and gateway on a vibrating surface that exceeds the vendor's specifications. Vibrations of antenna may affect the signal strength.

- Do not place devices where the temperature is outside their rated range. Battery may not last longer if device is operating at higher temperature than stated.
5. Although line of sight is always desirable for communication between wireless devices, this cannot be always possible in reality. There can be many obstacles such as buildings, piping, dense walls and long distances. Obstacles affect signal strength depending on their density.

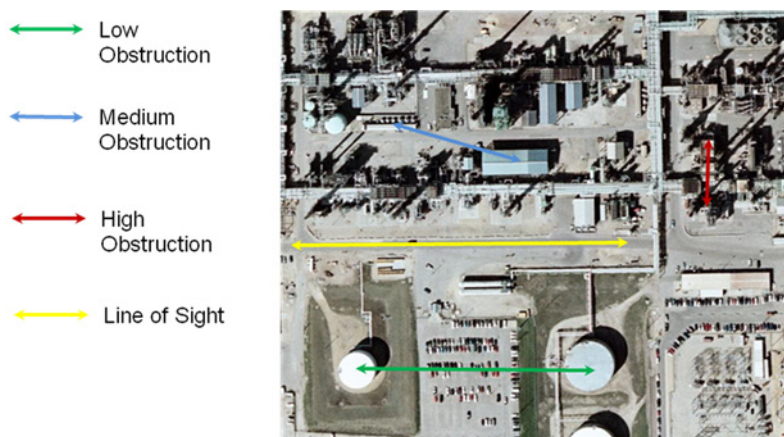


Figure 99. Different Obstacles in an Installation

In general distance from one wireless device to other wireless device or Gateway can be decided based on following conditions on site:

Line of Sight

- Clear line of sight to the device with no obstructions. Distance up to 250 meters possible.

Low Density

- Open areas to see from one device to other devices. Distance up to 150 meters possible.

Medium Density

- Can drive a truck through the process area. Distance up to 75 meters possible.

High Density

- Cannot see from one device to the next.
 - Significant metal and structural material. Distance up to 30 meters possible.
6. After installation of Gateway and Devices, verify that all the devices have joined the network and are communicating. This can be made sure by checking device status in Web Server of the Gateway. This test is corresponding to the loop tests done for wired devices.

If some devices are found missing then try repositioning existing devices or put additional device to bridge the connection. Also, check for issues like Join Key/Network ID not matching, Battery voltage not sufficient or no proper wiring between adapter and wired device.

Accessing Device Variables through Modbus Connection



Pepperl+Fuchs WirelessHART Gateway gets device variables for Modbus connectivity from devices by reading burst command 3. It is recommended that while ordering the device, ask the vendor for preconfigured devices with burst command 3. If it is not possible, then it needs to be changed in device using a Handheld. Refer to device manual or vendor website on how to change the burst command to 3.

Process variables of connected HART devices can be accessed from Gateway through Modbus channel and made available in AC800M Controller.

Following example shows how device variable can be accessed through MODBUS TCP using CI Module CI867.

In this example, some wired HART devices are connected to WirelessHART Adapters. Also, there are few wireless devices. The Gateway webpage instrument list shows them as shown in [Figure 100](#). In [Figure 97](#), clear the **Tree-View** check box. In this list, devices have index according to their order of appearance in the list. The Gateway itself has Index = 0, Device ROS22 has Index=1 and device with long tag 1A8A has Index=13 and so on.

Device Name: WHA-GW **Device Revision:** 1
Device Long Tag: TF2D3 **Descriptor:** WHA-GW2
NE107 Status: ■ Good **Timestamp of Status:** 11:37:52

Parameter Tree-View:

- Parameter
 - Identification
 - Wireless Communication
 - Setup
 - Instrument List
 - Burst Lists
 - Wired Communication
 - Interfaces
 - Serial
 - Ethernet
 - Protocols
 - HART
 - Modbus
 - Diagnosis
 - Identification
 - Wireless Communication
 - Detail
 - Wired Communication
 - Overview
 - HART
 - Additional Functions
 - Reset
 - About
 - Firmware upgrade

Index	Long tag	IO-Card	Channel	Device Type	Status
0	TF2D3			5DE0	
1	ROS22	0	0	2659	✓
2	ROS11	1	0	2658	✓
3	????????????????????????????????	2	0	1A99	✗
4	TWA-308	3	0	1A99	✓
5	TWA-301	4	0	1A99	✓
6		2	1	FFFF	✗
7	TWA-305	5	0	1A99	✓
8	370B	3	1	370B	✓
9	888881	4	1	1A1A	✓
10	3704	5	1	3704	✓
11	????????????????????????????????	6	0	1A99	⚠
12	TWA-303	7	0	1A99	✓
13	1A8A	7	1	1A8A	✓
14	????????????????????????????????	8	0	1A99	⚠
15	TWA-306	9	0	1A99	✓
16	MEASUREMENT	9	1	263B	✓

Figure 100. Gateway Webpage Instrument List

Gateway assigns variables of HART devices to different MODBUS register according to their index based on following rules.

1. Each device is provided with space of 12 MODBUS registers in the Gateway. Starting address of this space can be calculated as = 30013 + 12*(SID-1). Therefore, HART variables from the device TWA-308, which has Index =4,

will be available from register 30049 to register 30060. This can be checked in Gateway webserver.

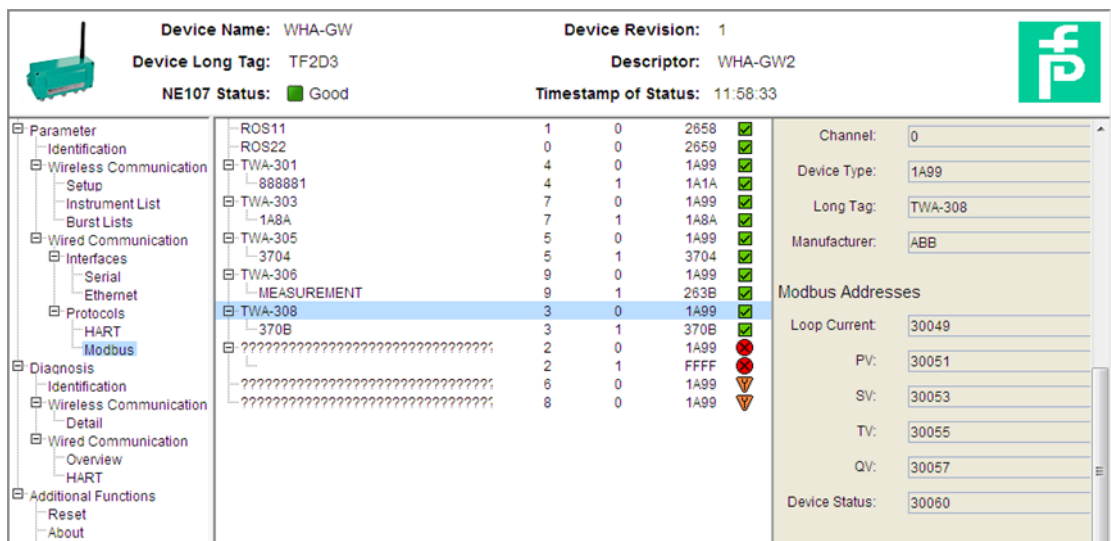


Figure 101. Gateway Webpage Instrument List 2

- HART variables are stored in the register as shown in Table 15 (Shown for Device with Index =1).

Table 15. HART Variables

30013	30014	AI	Primary Variable (loop current, mA unit)	32-bit floating point
30015	30016	PV	Primary Variable (device-specific unit)	32-bit floating point
30017	30018	SV	Secondary Variable (device-specific unit)	32-bit floating point
30019	30020	TV	Tertiary Variable (device-specific unit)	32-bit floating point

Table 15. HART Variables (Continued)

30021	30022	QV	Quaternary Variable (device-specific unit)	32-bit floating point
30023	-----	0	(for future expansion, always return 0)	16-bit unsigned integer
30024	-----	DevStat	Hart Device Status	16-bit unsigned integer

Accessing the variables in Controller



Before programming the Control Builder program, make sure that all the devices have joined the network and are assigned Modbus registers. Use the ‘Delete’ device functionality in Gateway webserver to delete devices for which there is no Modbus registers assigned.

Making changes to device list in Gateway at later point of time will require reconfiguring the Control Builder program.



The default password is admin. Replace this with a password that conforms with your organization's security policy at the first possible opportunity. Failure to replace the default password makes the system susceptible to unauthorized access.

Refer to the Password Security topic in *System 800xA Administration and Security (3BSE037410*)* for recommendations on establishing a password security scheme.

Gateway Webserver supports user access control. The default user name is ‘admin’ and password is ‘admin’.

The webserver will give a warning about security certification error. Select **Continue to this website** to proceed.

For details on MODBUS connectivity to AC800M controller refer to *AC 800M Communication Protocols (3BSE035982*)*.

In this example, the Gateway is connected to MODBUS TCP communication module CI867. Therefore, function blocks of MBTCPConnect and MBTCPReadCyc should be used.

The variables listed in [Figure 102](#) are defined in the Control Builder program:

	Name	Data Type	Attributes	Initial Value
1	enable	bool		true
2	channel	string[32]		'1'
3	partner	string[32]		'1.1'
4	Id	ModBusTCPCon		
5	CycleTime	time		10s
6	ENABLE1	bool	retain	true
7	SubDeviceId	dint		5
8	StartAddHeader[string[40]	retain	'%ID10#'
9	LoopCurrent	real		
10	PrimVar	real		
11	SecVar	real		
12	TerVar	real		
13	QuadVar	real		

Figure 102. Variable Defined in Control Builder

The program in offline mode is as shown in Figure 103.

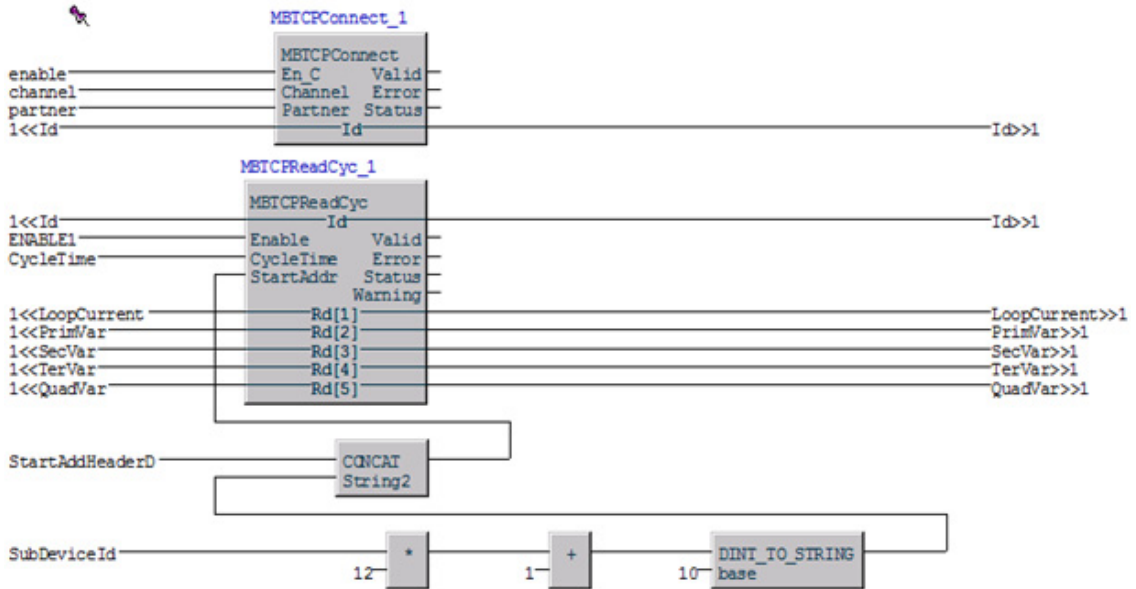


Figure 103. Program in Offline Mode

In Online mode, the variables are shown for device with Index =5 (i.e. TWA-301) as shown in Figure 104.

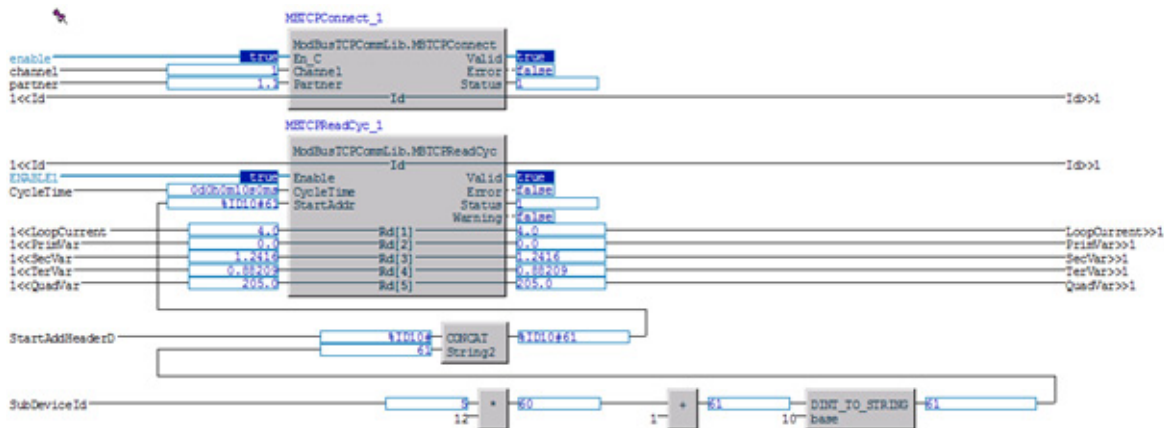


Figure 104. Program in Online Mode

The offset to access MODBUS register is by default set to 30000. Therefore, start address is calculated as %ID10#61 instead of %ID10#30061.

Gateway webpage shows the variable values as shown in Figure 105.

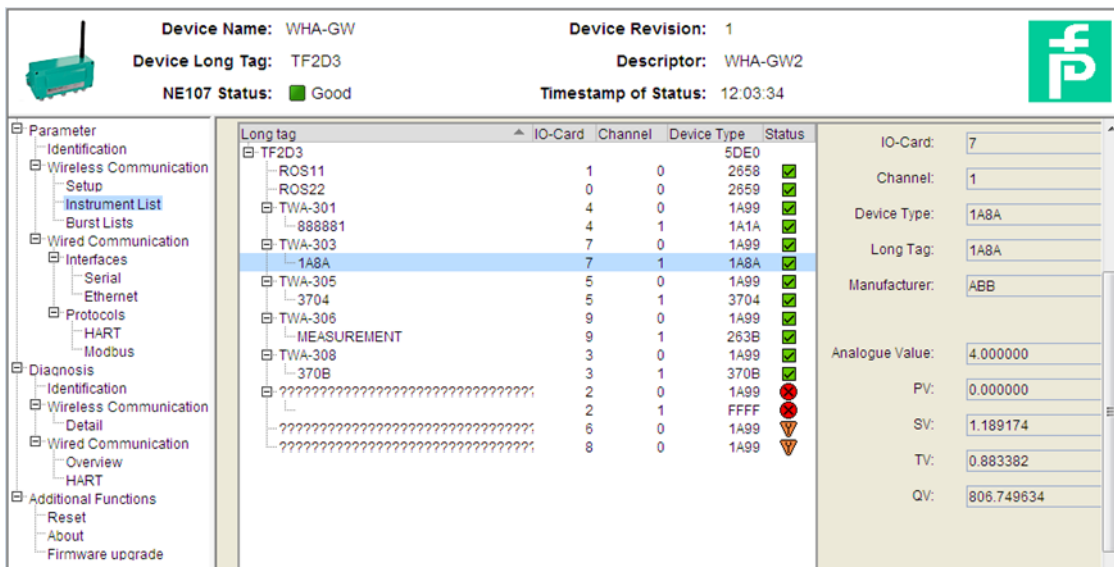


Figure 105. Gateway Webpage Variable Values

Accessing Device Status through Modbus

Device status is available as 2 byte information in following order:

LSB is "Device Status" with following Definition:

Table 16. Device Status

Bit Mask	Definition
0x80	Device Malfunction - The device detected a serious error or failure that compromises device operation.
0x40	Configuration Changed - An operation was performed that changed the device's configuration.
0x20	Cold Start - A power failure or Device Reset has occurred.

Table 16. Device Status

Bit Mask	Definition
0x10	More Status Available - More status information is available via Command 48, Read Additional Status Information.
0x08	Loop Current Fixed - The Loop Current is being held at a fixed value and is not responding to process variations.
0x04	Loop Current Saturated - The Loop Current has reached its upper (or lower) endpoint limit and cannot increase (or decrease) any further.
0x02	Non-Primary Variable Out of Limits - A Device variable not mapped to the PV is beyond its operating limits.
0x01	Primary Variable Out of Limits - The PV is beyond its operating limits.

Whereas MSB is 'Extended Device Status' with following definition:

Table 17. Extended Device Status

Code	Description
01	Maintenance Required - This bit is set to indicate that, while the device has not malfunctioned, the Field device requires maintenance.
02	Device Variable Alert - This bit is set if any Device Variable is in Alarm or Warning State. The host should identify the Device Variable(s) causing this to be set using the Device Variable Status indicators.
04	Critical Power Failure - For devices that can operate from stored power. This bit is set when that power is becoming critically low. For example, a device scavenging power losing that power source would set this bit. Devices must be able to sustain their network connection for at least 15 minutes from when this bit is set. A device may begin gracefully disconnecting from the network if its power level drops too low.

In order to access Device Status through Modbus a separate MBTCPReadCyclic block need to be created while keeping the same MBTCPConnect block. Here the start address will be start address of main MBTCPReadCyc block + 11.

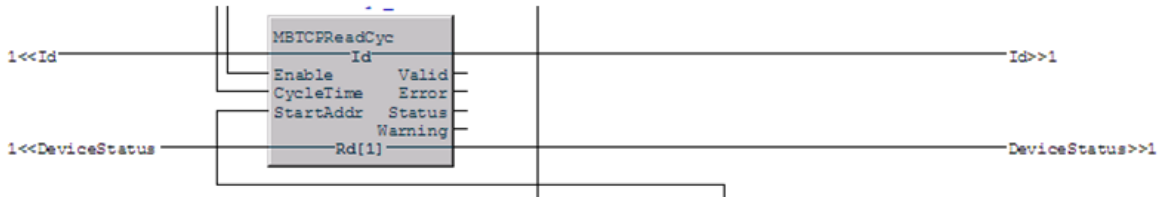


Figure 106. Program for Accessing Device Status through Modbus

Section 9 Bulk Data Management

The information in this section provides a general description of the Bulk Data Management. Refer to *System 800xA Engineering 5.1 Engineering Studio (3BDS011223*)* for more information on the standard workflow of the Bulk Data Manager.

Overview

This section describes the usage of Bulk Data Manager for device integration. The Bulk Data Manager is a component of the 800xA Engineering Workplace, composed of Microsoft® Excel and a set of Excel Add-Ins that integrate Microsoft Excel into Engineering Workplace.

The Excel spreadsheets together with Bulk Data Management enable the user to save manually object by object instantiation work. The user can easily re-use a typical solution built either as object type or as object instance using the spreadsheet based configuration functions of Bulk Data Manager to populate a plant model in the system.

The basic functionality of Bulk Data Management allows to configure a worksheet for reading out and writing back the properties of aspects of objects.

The user configures the worksheet by dropping in the aspects from the Plant Explorer and selecting the aspect properties of their interest. The data contents of this worksheet can be acquired by dropping in the objects of interest from Plant Explorer. Each row holds the data for one object. The properties of the corresponding aspects of the dropped in objects are shown in the configured columns.

This worksheet also allows to create new objects from object types or from already existing object instances and to create the placement of the objects in structures.

For example to duplicate a substructure of objects copy the area of rows corresponding to the objects of interest in the worksheet using well-known Excel functionality.

Edit the names of the new objects and the data of other properties and save the changed spreadsheet contents to the system by executing a *Save All Objects* command.

Refer to *Engineering, Engineering Workplace, Basic Engineering Functions Reference (3BDS011223*)*, for more information about Bulk Data Manager.



If the Bulk Data Manager is used to save data to Industrial IT applications in an operating environment, ensure that this does not conflict with secure plant operation. For device types, for example. HART devices, which have to be allocated to a special I/O channel, must be configured in two steps:

- 1.) Create through Bulk Data spreadsheet the device instance first.
- 2.) Allocate the device to the specific I/O channel using a new row in the Excel spreadsheet.

Configuration through Bulk Data Manager

The following operations based on a example for HART Multiplexer networks. Adapt the workflow for usage of other device type objects and networks.

Perform the following steps to work with Bulk Data Manager:

1. Open the Bulk Data Manager on the 800xA Engineering workplace through **ABB Start Menu > ABB Industrial IT 800xA > Engineering > Bulk Data Manager**.
2. Microsoft Excel with 800xA Add-Ins starts.

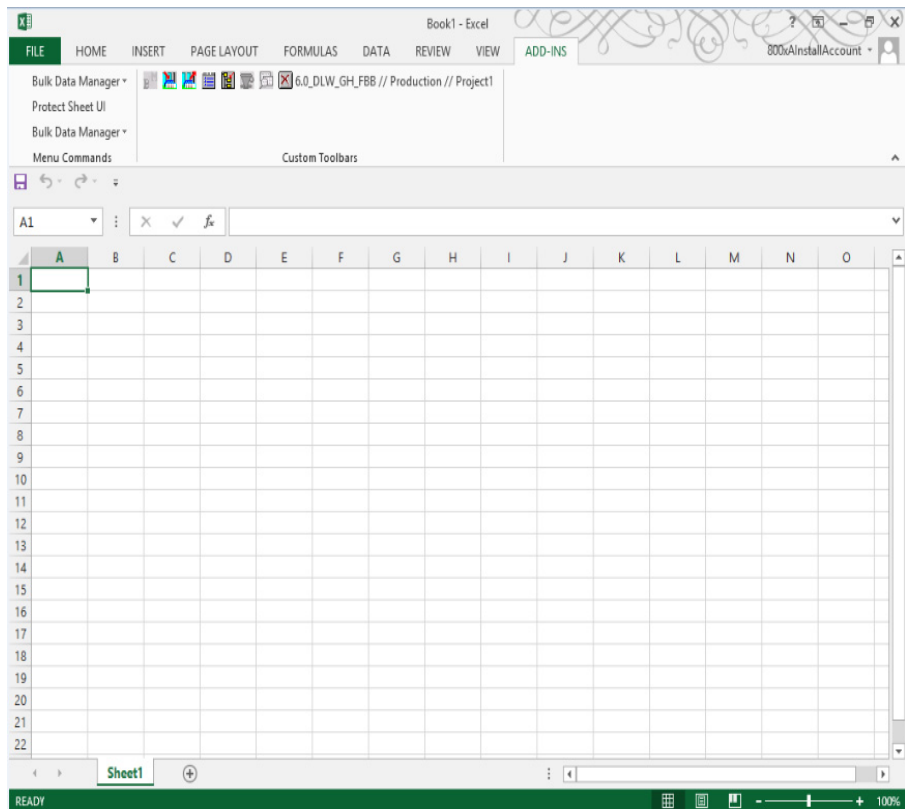


Figure 107. Bulk Data Manager start window

3. Open *Control Structure* in Plant Explorer.
4. Insert a network, for example. HART Multiplexer network below the **Root** node.
5. Select the Multiplexer Object,
6. Select the **Fieldbus Management** aspect and move it using drag-and-drop into the Bulk Data Manager excel spreadsheet on field *AI*.
7. In the **Configure Properties** dialog box select all items.

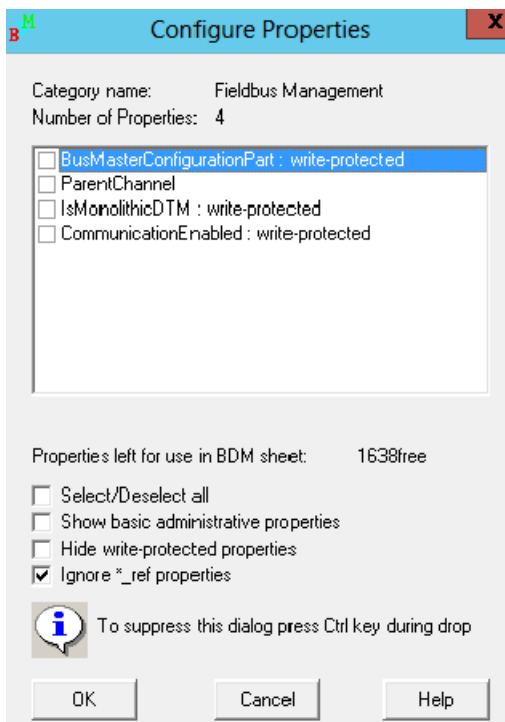


Figure 108. Configure Properties window

8. Click **OK**.

9. The Excel spreadsheet looks like [Figure 109](#).

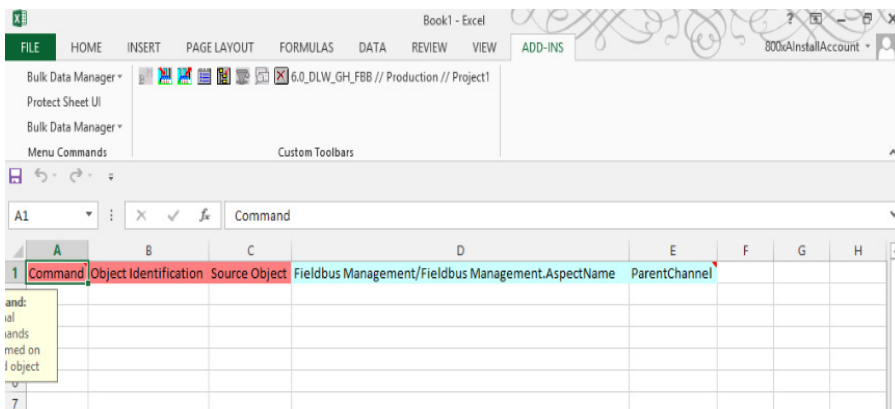


Figure 109. Import of Fieldbus Management aspect into the Bulk Data Manager

10. Switch to the Plant Explorer and select the *HART Multiplexer Subnet* object in the *Control Structure*.

11. Move the *HART Multiplexer Subnet* object using drag-and-drop from the *Control Structure* in the second row (A2) of Bulk Data Manager spreadsheet.

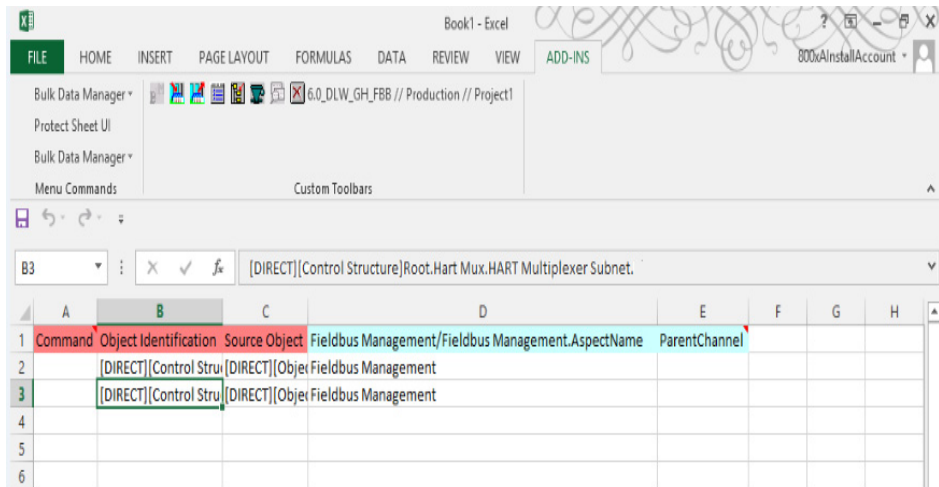


Figure 110. HART Multiplexer Subnet in Bulk Data Manager



The column *Object Identification* shows the *Control Structure* part, the column *Source Object* shows the *Object Type Structure* part. In the following configuration these both columns have to be configured with the following information:

- *Object Identification* column needs the *TAG* name listed in the certain export file form *List of Multiplexer* or *List of HART Devices*.
 - *Source Object* column needs the object type name of the specific Multiplexer or Device object type, listed in the Plant Explorers Object Type Structure.
12. Create one of the listed Multiplexer in *Control Structure* of the Plant Explorer as described in [Instantiation of HART Multiplexer Objects](#) on page 177.
 13. Scan for Multiplexer hardware as described in [Scanning for Multiplexer Hardware](#) on page 179.

14. For an easier configuration ABB recommends selecting all found Multiplexer hardware in the *List of Multiplexer* window and export them to a file.
15. Select the HART Multiplexer object in the *Control Structure*.
16. Move this object using drag-and-drop from the *Control Structure* in the third row (A3) of Bulk Data Manager spreadsheet.

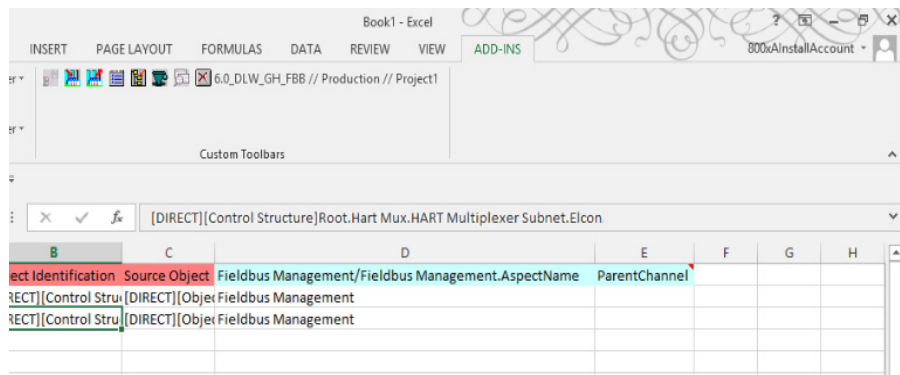


Figure 111. ELCON Multiplexer in the Bulk Data Manager

17. Copy row 3 in the Excel spreadsheet as many times as Multiplexer hardware is listed in the export file.
18. Exchange in the column *Object Identification* and *Source Object* of all new copied Multiplexer rows the specific configuration with the hardware parameter shown in the export file.

Example:

Object Identification of the original object (row 2) shows “ELCON2” which means the TAG name of the device. In the next row (3) the Multiplexer has the

TAG name “*Pepperl&Fuchs*” (which can be seen in the export file), this name has to be adapted in cell *B4*.

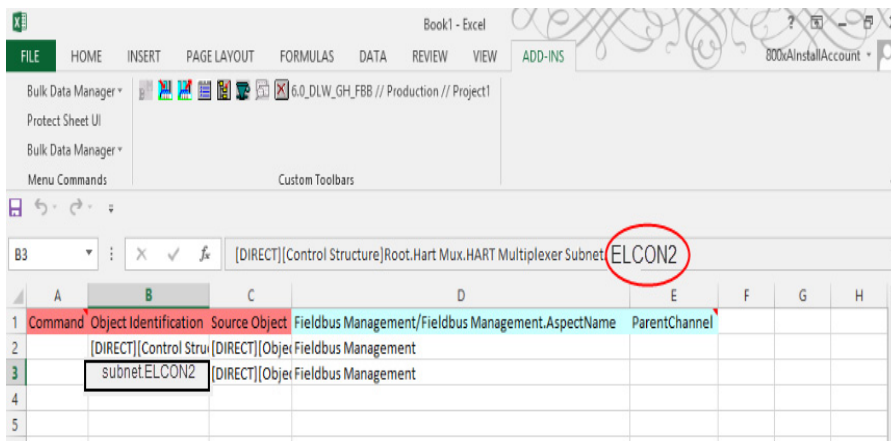


Figure 112. Object Identification row in the Bulk Data Manager

Source Object of the original object (row 2) shows “*Series 2700-F*”, means the name of the used Multiplexer object type. In the next row (3) the used Multiplexer object type shall be adapted to the Pepperl+Fuchs Multiplexer. Have a look to the *Object Type Structure* and find out, which is the correct

name for a Pepperl+Fuchs Multiplexer hardware (in this case “KFD2-HMM-16”). Exchange the name in cell C4 with *KFD2-HMM-16*.

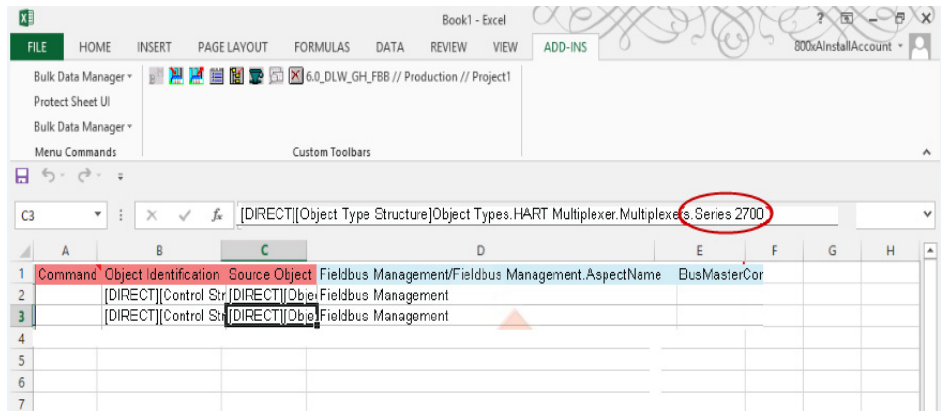


Figure 113. Source Object row in the Bulk Data Manager

- Set the network name for each Multiplexer object in the excel sheet. The network name is shown in the export file, and must be inserted in the column “*ParentChannel*”,

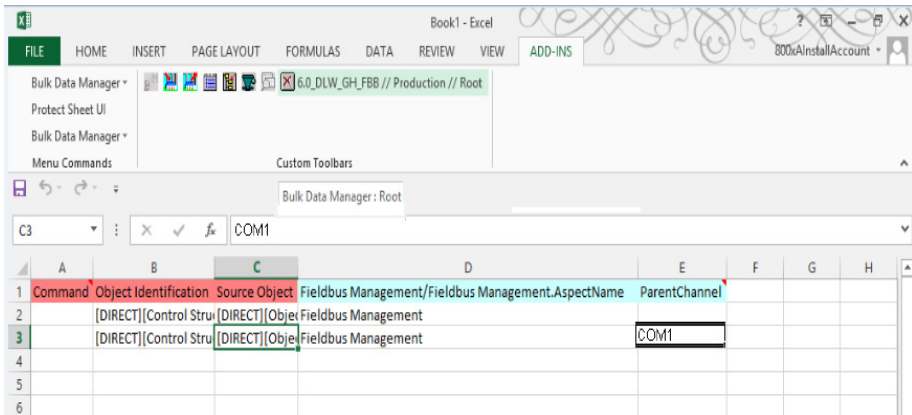


Figure 114. Network name configuration

- For those objects, which are already configured in *Control Structure* of the Plant Explorer, select the first column “command” in the Excel spreadsheet and select the system and the structure of 800xA. Select **system** in the Bulk Data Manager.

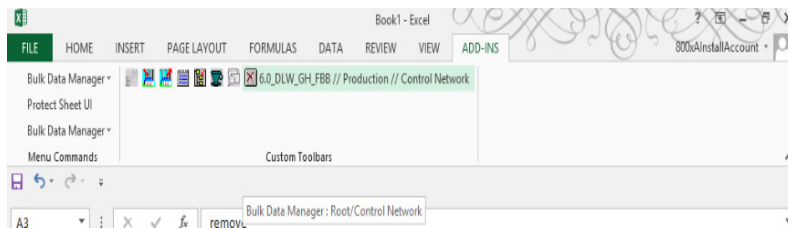


Figure 115. Select the System

21. Select the structure/project in the new window, in which the configured Bulk Data sheet shall be saved.

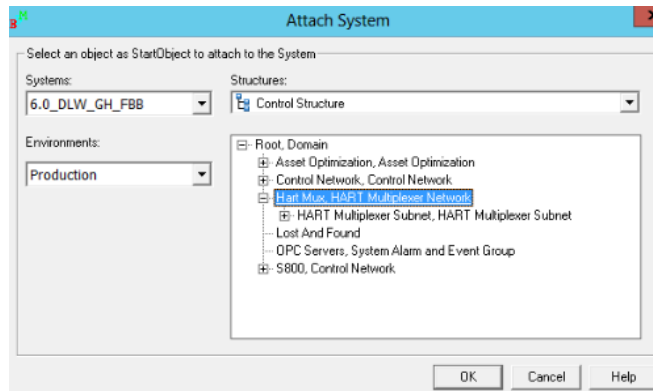


Figure 116. Select the Structure

22. Click **OK**
23. Click **Save all Objects** twice in the Bulk Data Manager.

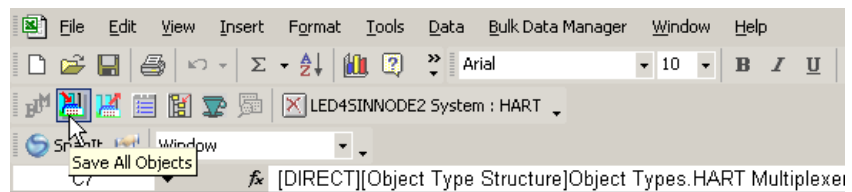


Figure 117. Save all Objects



Multiplexer objects are created in *Control Structure* of the Plant Explorer in the selected structure.

24. Open *Control Structure* in the Plant Explorer.
25. Configure the Multiplexer channels as described in [Multiplexer Channel Configuration](#) on page 185.

26. Select a Multiplexer object.
27. Scan for Device hardware as described in [Scanning HART Devices](#), on page 188.
28. For an easier configuration we recommend to select all found Device hardware in the *List of HART Devices* window and export them to a file.



Repeat step 25 to 27 for all Multiplexer objects in the *Control Structure*.

29. Switch to the Bulk Data Excel sheet and insert as many rows below the Multiplexer objects as devices are listed in the specific export file.
30. Switch back to the Plant Explorer.
31. Create only one new instance of a HART device below a Multiplexer object. Use the list in the export file to find out, which is the correct device object type in the *Object Type Structure* of the Plant Explorer (Also, refer to [Instancing HART devices](#) on page 193).
32. Select the HART device object in the *Control Structure*.
33. Move this object using drag-and-drop from the *Control Structure* in the fourth row (A4) of Bulk Data Manager spreadsheet.

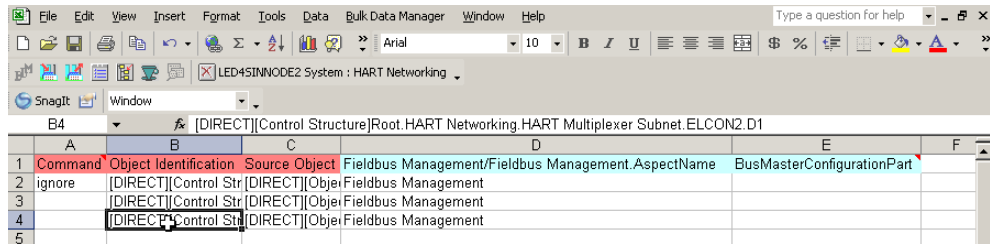
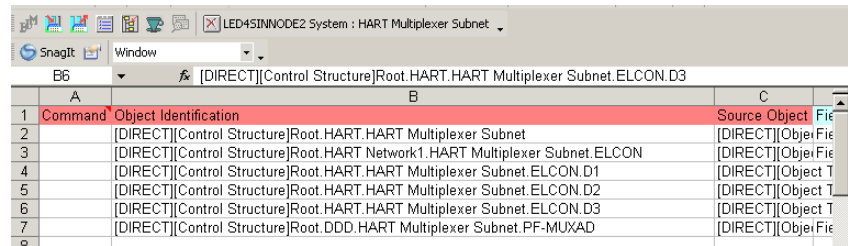


Figure 118. Device Object in the Bulk Data Manager

34. Copy row 4 in the Excel spreadsheet as many times as device hardware is listed in the export files below the Multiplexer object rows.

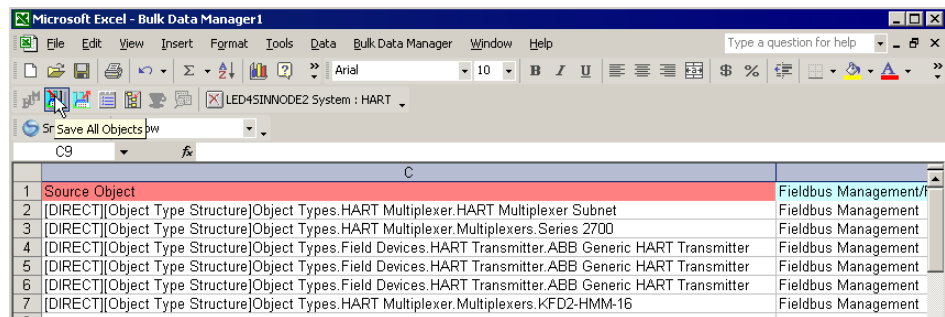
35. Exchange in the column *Object Identification* and *Source Object* of all new copied device rows the specific configuration with the hardware parameter shown in the export file (analog to step 17).

Example:



Command	Object Identification	Source Object
	[DIRECT][Control Structure]Root.HART.HART Multiplexer Subnet	[DIRECT][Objec
	[DIRECT][Control Structure]Root.HART.Network1.HART Multiplexer Subnet.ELCON	[DIRECT][Objec
	[DIRECT][Control Structure]Root.HART.HART Multiplexer Subnet.ELCON.D1	[DIRECT][Object T
	[DIRECT][Control Structure]Root.HART.HART Multiplexer Subnet.ELCON.D2	[DIRECT][Object T
	[DIRECT][Control Structure]Root.HART.HART Multiplexer Subnet.ELCON.D3	[DIRECT][Object T
	[DIRECT][Control Structure]Root.DDD.HART Multiplexer Subnet.PF-MUXAD	[DIRECT][Objec

Figure 119. Object Identification



Source Object	Fieldbus Management/f
[DIRECT][Object Type Structure]Object Types.HART Multiplexer.HART Multiplexer Subnet	Fieldbus Management
[DIRECT][Object Type Structure]Object Types.HART Multiplexer.Multiplexers.Series 2700	Fieldbus Management
[DIRECT][Object Type Structure]Object Types.Field Devices.HART Transmitter.ABB Generic HART Transmitter	Fieldbus Management
[DIRECT][Object Type Structure]Object Types.Field Devices.HART Transmitter.ABB Generic HART Transmitter	Fieldbus Management
[DIRECT][Object Type Structure]Object Types.Field Devices.HART Transmitter.ABB Generic HART Transmitter	Fieldbus Management
[DIRECT][Object Type Structure]Object Types.HART Multiplexer.Multiplexers.KFD2-HMM-16	Fieldbus Management

Figure 120. Source Object



The Fieldbus Management/Fieldbus Management aspect name is configured as the first moved object.

36. Set the channel parameter for each device object in the excel sheet. The channel parameter is shown in the export file, and must be inserted in the column “*ParentChannel*”.

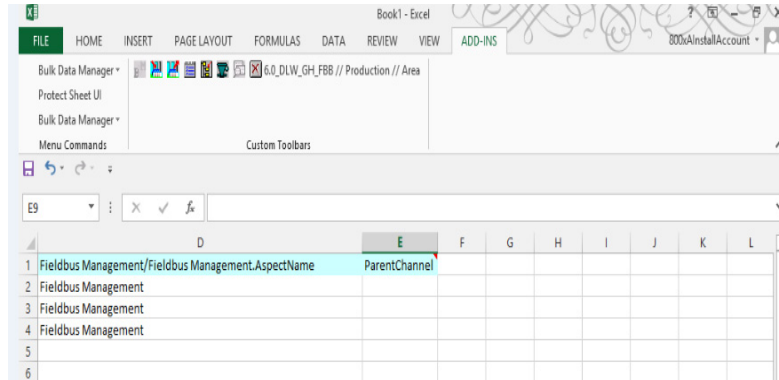


Figure 121. Ignore Excel rows

37. For those objects, which are already configured in *Control Structure* of the Plant Explorer, select in the Excel spreadsheet the first column “command” and choose from the menu *ignore*.

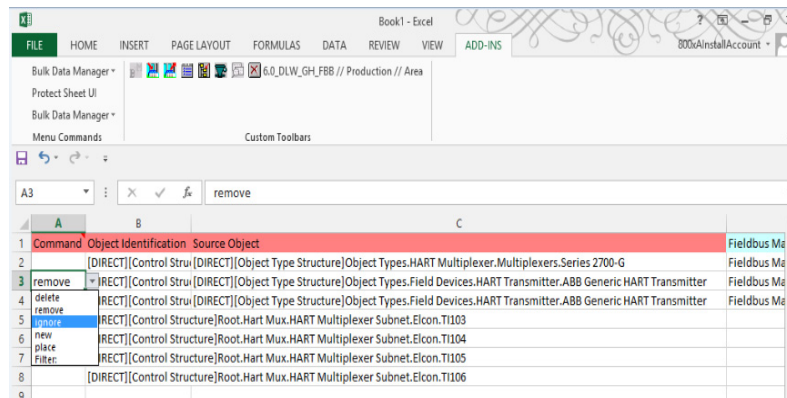


Figure 122. Ignore Excel rows



Rows in the Bulk Data Excel spreadsheet, which are marked with ignore, are being not saved to the 800xA system.

38. Select the system and the structure of 800xA. Select **System** in the Bulk Data Manager.

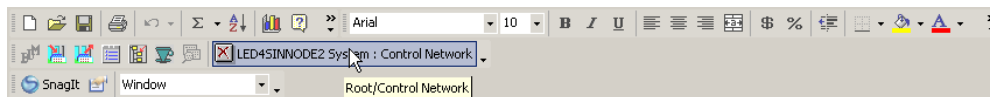


Figure 123. Select the System

39. Select in the new window the structure/project, in which the configured Bulk Data sheet is saved.

Figure 124. Select the Structure

40. Click **OK**.
41. Click **twice** on **Save all Objects** button in the Bulk Data Manager.

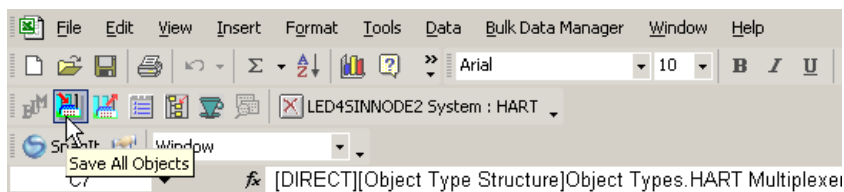


Figure 125. Save all Objects



Device objects are created in *Control Structure* of the Plant Explorer in the selected structure. All device objects are assigned to the correct Multiplexer channel. Manual adjustments are possible as described in this document.

Appendix A Error Messages

[Table 18](#) lists the error messages for 800xA Device Management PROFIBUS and HART 5.1.

Table 18. Error Messages

Sl. No.	Message/Symptoms	Possible Reason(s)	Possible Solution
1	ABB BUI DTMs cannot be opened from <i>Control Structure</i> .	<ol style="list-style-type: none"> 1. Installation problem. 2. DCOM settings not done. 	<ol style="list-style-type: none"> 1. Go to Add or Remove Programs and check if the DTM is installed properly. 2. Check if Device Definition aspect points to the right DTM. 3. Check if DCOM settings are done. Refer to the release notes of corresponding Device Library.
2	<ol style="list-style-type: none"> 1. ABBFDT~1.exe - Application Error. The instruction at "0x7336a191" referenced memory at "0x01272f9c". The memory could not be "read". Click OK to terminate the program. <p>OR</p> <ol style="list-style-type: none"> 2. After configuring the FBB-OPC Data Source Definition aspect, the corresponding service does not start and remains in initialize state or fluctuates between initialize and service state periodically. 	OPC configuration file may be missing.	<ol style="list-style-type: none"> 1. Disable PROFIBUS/HART OPC Server (services disabled in <i>Service Structure</i>) 2. Re-configure PROFIBUS/HART OPC Server 3. Restart PROFIBUS/HART OPC Server service.

Table 18. Error Messages (Continued)

Sl. No.	Message/Symptoms	Possible Reason(s)	Possible Solution
3	<p>It is not possible to add IO modules (for example S800/S900) or PROFIBUS Device in the hardware tree in Control Builder or while adding HART device under IO module.</p> <p>Following messages may appear:</p> <ul style="list-style-type: none"> - [Error] This topology is invalid due to the business rules of the DTM. - Operation not allowed due to an open dialog in Control Builder. - Source code error when accessing Controller. - Error code: 80004004 native message: - User message: Error writing source block. - Failed to add unit. <p>OR</p> <ul style="list-style-type: none"> - Catastrophic failure. <p>OR</p> <ul style="list-style-type: none"> - Invalid topology data. DTM out of order? 	<ol style="list-style-type: none"> 1. DTMs for IO module or device type is not installed or corrupted. 2. Corrupted projects because of wrong Import/Export. 	<ol style="list-style-type: none"> 1. Repair DTM installation or Re-install Device DTM using Device Library Wizard. 2. Contact ABB support to run FBBAspectValidator tool.

Table 18. Error Messages (Continued)

Sl. No.	Message/Symptoms	Possible Reason(s)	Possible Solution
4	Connect to HART device failed: TRS Error -1.	Tool Routing is not enabled in Controller.	Enable Tool Routing: <ol style="list-style-type: none"> 1. Open Control Builder project. 2. At controller module select Tool Routing. 3. Select Enabled. 4. Download to the Controller.
5	Some 3rd party DTMs do not work in 800xA, although they work in other Frame application like PACTWARE.		<ol style="list-style-type: none"> 1. Use only the DTMs which are certified by Device Integration Center to be used with 800xA. Contact: DIC@in.abb.com 2. Working with PACTWARE will not guarantee that DTM works with other Frame applications. Contact DTM vendor for further assistance.

Table 18. Error Messages (Continued)

Sl. No.	Message/Symptoms	Possible Reason(s)	Possible Solution
6	<p>During consistency check, following error messages might occur from PROFIBUS Hardware Libraries:</p> <ul style="list-style-type: none"> - [Error] Library key must not be used on 'ABB_TFx12_PA 1.2-0:Aspect Category Definition'. ... : Library Version Definition. - [Error] Aspect 'ABB_TFx12_PA 1.2-0:Hardware Library' contains multiple library keys. ... : Library Version Definition. - [Error] Library key must not be used on 'ABB_TFx12_PA 1.2-0:Object Type Structure'. ... : Library Version Definition. <p>3 error(s) reported by 1 aspect(s). 1 aspect(s) can be repaired.</p>	<p>This is a known issue which has no impact on working or performance of system apart from these error messages.</p>	<p>Ignore the errors.</p>
7	<p>DTM GUI may not appear when accessing the system using remote desktop.</p>	<p>Remote desktop is not accessed in console mode.</p>	<p>When using remote desktop to access DTM GUI, always use console mode.</p>

Table 18. Error Messages (Continued)

Sl. No.	Message/Symptoms	Possible Reason(s)	Possible Solution
8	Device Object Type installation using Device Library Wizard shows errors. For example: - Error message: "Could not find a part of the path \HWLib\Import".	Device Object Type may not be released for particular system version. Check corresponding Device Type release notes for the system version information.	From 5.0 onwards the device Object Types have been re-packaged as Hardware Libraries for PROFIBUS Object Types. These Hardware Libraries contain all the device modules, which were required to be installed separately in system version 4.x. For example, ABB device PDP22 and UMC22 requires to install both the Device Object Types in system version 4.x. But in system version 5.x it is required to install only PDP22 object type as it contains UMC22 object type internally. Installation of UMC22 Device Object Type results in error on installation in system version 5.x.
9	Control Connection aspect for PROFIBUS device may not show any items.	PROFIBUS Device Object libraries supplied by Device Integration Center do not have OPC items defined. It is only available for HART device types.	Use Hardware Unit aspect which provides cyclic data for PROFIBUS data.
10	Device Library Wizard installation consists of two components; Client and Server. Where to install which component?	Frequently asked question.	DLW Client + DLW Server --> On all Aspect server nodes. DLW Client --> On all other nodes. DLW Client + DLW Server --> In case of single node system.

Table 18. Error Messages (Continued)

SI. No.	Message/Symptoms	Possible Reason(s)	Possible Solution
11	The Device Definition aspect of the object type is unavailable.	1. Device Object Type not installed properly. 2. The Device Definition aspect was deleted manually or not restored properly.	Install the Device Object Type again and check in <i>Object Type Structure</i> if Device Object Type contains the Device Definition aspect and it points to the right DTM.
12	Licence for Device Management PROFIBUS and HART is exceeded. Check 800xA License Server.	More number of devices for PROFIBUS and HART are configured then actual license ordered.	Get license with more number of PROFIBUS/HART devices
13	The device type instance do not have an assigned DTM usable in this topology.	DTM was not installed properly or was installed by the user who do not have administrator rights.	Install the Device Object Type again.
14	Saving DTM data set failed.	Problems with DTM installation.	Reinstall the corresponding DTM.
15	This action cannot be performed while the fieldbus branch is in Communication Enabled mode.	User is trying to perform certain actions when Fieldbus branch is online. For example, assigning a HART Device to AI895 module.	Set Fieldbus Branch in Offline mode before performing the desired actions.

Table 18. Error Messages (Continued)

Sl. No.	Message/Symptoms	Possible Reason(s)	Possible Solution
16	Error in Interprocess communication (Access to DeviceManagementServer failed).	1. Services like Alarm and Events, AO, System Status viewer trying to access large number of devices. 2. Not proper license for PROFIBUS/HART. 3. Service account and DCOM settings not set properly.	1. Check for proper license. 2. Check if Service Account is set as per 800xA documentation. 3. Check following DCOM settings: DeviceManagementServer: Service Account. DeviceManagementServerUserWrapper: Service Account. DeviceManagementServerIU: Interactive User. DMSWatchDog: Service Account 4. Configure services (for example, System Status Viewer, Alarm and Event lists) in a way that lot of Device Management aspects are not accessed simultaneously.
17	The device type instance cannot be deleted.	Some pending tasks like opened GUI DTM in another window are there while performing this action.	Make sure DTM GUI is properly closed before deleting device type instance.
18	Address-synchronization between device type instance and DTM failed.	Bus address information in Control Builder and in DTM is mismatching. This may be because of problems in backup restore and wrong import-export.	1. Sometimes it might help to close and reopen both Control Builder and Plant Explorer. 2. Contact ABB support to run FBBAAspectValidator tool.

Table 18. Error Messages (Continued)

SI. No.	Message/Symptoms	Possible Reason(s)	Possible Solution
19	Cannot find the Device Type Object in 800xA's <i>Object Type Structure</i> . This source object can be deleted.	Source Device Object Type in <i>Object Type Structure</i> was deleted while instances are there in <i>Control Structure</i> .	Install Device Object Type again using Device Library Wizard.
20	This device type instance could not be placed into the topology because of device specific rules.	User is trying to perform certain actions which are not allowed by business rules like assigning a HART device under CI854 module.	Follow the device type assignment rules.
21	This device type instance could not be removed from the topology because of device specific rules.	User is trying to perform certain actions which are not allowed by business rules like deleting CI854 module while DTM for children is opened somewhere.	Follow the device type assignment rules.
22	Entity of this device type instance is not reserved. Changes cannot be saved.	For 800xA system version 5.0, it is required to reserve a device type before performing engineering activities. Saving of DTM dataset will not be allowed if device type instance is not reserved by Current user.	Reserve the device type before performing engineering activities.

Table 18. Error Messages (Continued)

Sl. No.	Message/Symptoms	Possible Reason(s)	Possible Solution
23	The FDT services failed. A part of the software does not respond or is not accessible. Close all applications and restart the system.	Software installation problems	<ol style="list-style-type: none"> 1. Close Plant Explorer and check that all the services related to device management are not running in Task Manager (DeviceManagementServer.exe, DeviceManagementSingleton.exe). 2. Reopen Plant Explorer. 3. If this does not solve problem then try to install Device Management Softwares again. 4. Contact ABB support.
24	DTM of that device does not support multiuser handling. It will be restarted to load current data	DTM vendor has designed the DTM for single user access at a time.	Since DTM does not support Multiuser handling, restrict access to DTM with only one user at a time.
25	Synchronization on node %NODE% is lost. Filedbus Builder PH will shutdown to prevent inconsistent data. Running actions will be cancelled.	Synchronization of Aspect Directory to the node is lost while performing Device Management activities.	Restart the node and make sure it is connected to Aspect Server.
26	The Aspect Directory Server rejected storage of data.	<ol style="list-style-type: none"> 1. Aspect servers are in Read only mode. 2. Some other reserved the entity while working with DTMs. 	Save DTM data when Aspect server is not in read-only mode and make sure Device type is reserved.
27	This device type instance cannot be created.	<ol style="list-style-type: none"> 1. Device Object Type are not installed properly. 2. DTM business rules do not allow this action. 	<ol style="list-style-type: none"> 1. Install Device Object Type again. 2. Follow the device type assignment rules.

Table 18. Error Messages (Continued)

SI. No.	Message/Symptoms	Possible Reason(s)	Possible Solution
28	Device Management aspect might be deleted and needs to be recreated at this device type instance.	Device Type instance corrupted.	Reinstall the corresponding Device Object Type.
29	Access to the DTM for object failed. If it is the first call to this kind of DTM, there might be a general problem (bad installation?). Otherwise, the DTM might be killed by the Operating System after an Access Violation. The DTM of this device type instance cannot be accessed. Verify device type installation.	Device Type DTM installation might be corrupted.	Reinstall the corresponding Device Object Type.
30	Init DTM functions failed / Initialization of this device type instance failed.	DTM is not working properly or not installed correctly.	Reinstall the corresponding Device Object Type.
31	The <i>Control Structure</i> out of synchronization.	DTM not working properly.	1. Restart the Plant Explorer. 2. If it does not solve the issue contact ABB support.
32	The Object has no Control Structure aspect. Each Fieldbus Object needs to be located in the <i>Control Structure</i> .	Instance not created in <i>Control Structure</i> .	Make sure all the Fieldbus Device type instances are available in <i>Control Structure</i> .
33	Error initializing property access.	DTM installation has problems or DTM is not as per FDT standard	Reinstall DTM and if this does not solve the problem, contact ABB support (in case DTM is delivered by Device Integration Center) or contact DTM vendor.

Table 18. Error Messages (Continued)

Sl. No.	Message/Symptoms	Possible Reason(s)	Possible Solution
34	Cannot access XML schema-cache. Shut down all windows and restart the system	No proper user rights or DTM installation has problems.	Restart the Plant Explorer.
35	The XML schema path could not be found.	Software installation problem.	Reinstall Base Container.
36	Fieldbus Mgmt View: Run-Time error 91, Object Variable or with block variable not set. Device Management View: Got Hanged and blank.	Multiple reasons.	1. Restart the Plant Explorer. 2. If this does not solve problem then reinstall Base Container. 3. Contact ABB support.
37	Setting "Online" failed - device is not assigned to a channel.	1. Trying to set the device online which is actually not assigned to a channel. 2. Imported the project from a system where Device Management was not installed to the system where Device Management software is installed. 3. DTM parameters set wrongly with Bulk Data Manager.	1. Assign the devices to corresponding channels manually. 2. Contact ABB support to run the FBBAspectValidator tool.
38	All open DTM user interfaces cannot be closed.	There are possibly some DTM GUI opened or running as background task (for example, WrapperFDT12.exe process of BUI DTMs).	1. Wait for the DTM to complete the current process. 2. Restart the Plant Explorer.

Table 18. Error Messages (Continued)

SI. No.	Message/Symptoms	Possible Reason(s)	Possible Solution
39	The DTM does not support Upload/Download.	Performing Upload/Download actions on DTMs which do not support these actions. For example, IO Module DTM or CI854DTM.	Do not try Upload/Download with DTMs which do not support it.
40	Device is currently not accessible. Cannot perform requested action.	Performing actions like upload when DTM is going offline.	Wait for DTM to finish current the action.
41	This function is not supported by this device type. DTM does not support this function (COM interface not available) [%ARG1%]	DTM might not be supporting one or many functions like Unlock/LockDataset, Verify, GetDeviceStatus, OfflineCompare, OfflineCompareWithGUI, CancelAction, UploadRequest, DownloadRequest, GetParameters, SetParameters, GetItemInfoList, ReadRequest, WriteRequest, and ScanRequest.	<ol style="list-style-type: none"> 1. Check the corresponding device type release notes for functionality limitations and workarounds. 2. Contact DTM vendor for more details if DTM is not integrated by Device Integration Center.
42	Invalid channel ID.	Problems with the DTM.	<ol style="list-style-type: none"> 1. Check the corresponding device type release notes for functionality limitations and workarounds. 2. Contact DTM vendor for more details if DTM is not integrated by Device Integration Center.

Table 18. Error Messages (Continued)

Sl. No.	Message/Symptoms	Possible Reason(s)	Possible Solution
43	COM error.	Problems with the DTM	<ol style="list-style-type: none"> 1. Restart Workplace. 2. Reinstall DTM. 3. Contact ABB support.
44	<p>BaseDtmMain: AssertState: Wrong function call in(Current state is)</p> <p>For example:</p> <p>BaseDtmMain: AssertState: Wrong function call in IDtmParameter (current state is existingcreated)</p>	<ol style="list-style-type: none"> 1. There can be many reasons for these type of messages. Most common reason could be that current DTM state does not allow certain user action. For example, trying to go offline when DTM upload is going on. 2. Or this may be issue with DTM itself. 	<ol style="list-style-type: none"> 1. Restart Workplace. 2. Reinstall DTM. 3. Contact ABB support.

Table 18. Error Messages (Continued)

SI. No.	Message/Symptoms	Possible Reason(s)	Possible Solution
45	<p>Following additional Error messages may appear:</p> <ul style="list-style-type: none"> (a) Cancel online action failed. (b) Init compare failed. (c) Setting DTM parameters failed. (d) Setting channel parameters failed. (e) Import DTM data failed. (f) Export DTM data failed. (g) ActiveX control error. (h) Invalid function call. (i) Set communication failed. (j) Release communication failed. (k) Prepare to release communication failed. (l) Prepare DTM to delete failed. (m) Prepare to release failed. (n) Initializing DTM failed. (o) Initializing environment failed. (p) Loading DTM data failed. (q) Creating DTM instance for prog ID failed. (r) Invalid COM Prog ID (s) Invalid system tag. (t) Invalid Prog ID. 	<p>There may be different reasons for these type of error messages to appear. Most common ones are incomplete DTM installation, problems with DTMs, certain user actions while DTM is busy doing something.</p> <p>Or</p> <p>Device Object Type instance not reserved.</p>	<ol style="list-style-type: none"> 1. Restart Workplace. 2. Reinstall DTM. 3. Contact ABB support.

Table 18. Error Messages (Continued)

Sl. No.	Message/Symptoms	Possible Reason(s)	Possible Solution
46	<p>Error initializing property access.</p> <p>Error in interprocess communication for FDT-Services.</p> <p>DOM load failed.</p>	<p>1. DTM installation has problems or DTM is not as per FDT standard.</p> <p>2. Services like Alarm and Events, AO, System Status Viewer trying to access large number of devices.</p>	<p>1. Reinstall DTM.</p> <p>2. Restart Plant Explorer workplace.</p> <p>3. Configure services (for example, System Status Viewer, Alarm and Event lists) in a way that lot of Device Management aspects are not accessed simultaneously. Also, it may help to reconfigure OPC Server P/H once if it has been in use.</p> <p>3. Contact ABB support.</p>
47	<p>Error Message InitParameters: Project Related Path (C:\\Engineer IT Data\\Fieldbus Builder PH\\DTM\\..) has no write access.</p>	<p>This problem may be because of wrong configuration of user roles or user does not have proper rights.</p>	<p>Check user access rights for current user. Also, check if Service User account is set properly.</p>

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