Operating instruction manual

Topology Editor A2LP131

Configuring device topology and connections as well as properties of device, port and connection

V1.1010

Hilscher Gesellschaft für Systemautomation mbH
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Table of contents

Contacts... 42

1   Introduction

1.1   About this manual

This manual describes the YOKOGAWA Topology Editor A2LP131 and how to configure a device topology (network structure), the connections between the devices as well as the properties of the device, port and connection.

1.1.1   Overview

For the main descriptions of the Topology Editor, see sections:

- *Installation* [▶ page 11]
- *About the Topology Editor* [▶ page 12]
- Start Topology Editor
- *Introduction to the user interface* [▶ page 16]
- Configuration of PROFINET IO IRT

1.1.2   List of revisions

Index	Date	Version	Component	Revisions
1	18-12-18	V1.1010	Yokogawa A2LP131 PROFINET IO Controller DTM	All sections created.

1.1.3   Online help

The Topology Editor contains a built-in online help.

➢ You can access the online help via the **F1** key.

1.1.4 Conventions in this manual

Notes, instructions and results of operating steps are marked as follows:

Notes

Important:
<important note you must follow to avoid malfunction>

Note:
<general note>

<note where to find further information>

Instructions

1. Operation purpose
2. Operation purpose
   ➢ Instruction

Results

⤳ Intermediate result

⇨ Final result

Safety messages

The labeling of safety messages is explained in the chapter Safety.

1.1.5 Language convention for PROFINET

For PROFINET the PROFINET IO specification defines the terms "Controller" instead of "Master" and "Device" instead of "Slave". In this manual "Controller" and "Device" are used with the PROFINET IO device or the DTM. For general questions about master or slave functions, the terms "Master" and "Slave" are used. Examples: "Master bus line" (in the network configuration) or "Master diagnosis" (general diagnostic function) or "Slave DTM" or "Stand-alone slave" (in the device catalog).

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2   Installation

2.1   Requirements

Prerequisites for the Topology Editor

- To install your configuration software with the Topology Editor, Microsoft .NET Framework 4.0 must be installed on your computer.

- Read the installation manual for your configuration software (e.g. SYCON.net) and the operating instruction manual for the DTM you are using (e.g. PROFINET IO-Controller DTM for RT) to find out which general requirements apply for the installation of these components.t

2.2   Shipment

The Topology Editor is integrated as part of the DTM in each FDT frame application.

SYCON.net

If you are using the configuration software SYCON.net, you will receive the installation file

- SYCON.net netFrame setup.msi

- SYCON.net FDTContainer setup.msi

- A2LP131PNIOControllerDTMSetup.msi

- PNIOGenericDeviceDTMnoPROFIsafeSetup.msi

which includes the YOKOGAWA A2LP131 PROFINET IO-Controller DTM for RT mode inclusively the plug-in for the Topology Editor A2LP131.

2.3   Installing the Topology Editor

Install your configuration software in accordance with the manufacturer's instructions. The Topology Editor is installed along with the master DTM (Example PROFINET IO-Controller DTM for RT mode).

SYCON.net

Install the configuration software SYCON.net as described in the software installation user manual of your YOKOGAWA device.

3   Description of the Topology Editor

3.1   About the Topology Editor

The Hilscher **Topology Editor** supports the configuration of a device topology (network structure) including the connections between devices and the related settings of the related device, port and connection. The Topology Editor can be used for the configuration of different Real-Time Ethernet systems.

The Topology Editor is integrated as a plug-in in a DTM of any network system and can be used in any frame application which supports FDT.

In addition to the device configuration in the DTM, additional device and connection data (for the topology) can be displayed or configured in the Topology Editor. Hidden devices such as switches or media converters can be displayed.

In the topology view (graphical view of the editor with the network structure), the IO devices can be connected to each other. Each link is represented as a line that begins at the port of one device and ends at the port of the other device.

In the property views of the device, port and connection, the settings of the devices, ports and connections can be configured. Using this data, the Topology Editor checks the identity of the existing devices and whether a connection has been established.

The configuration data for the network structure, devices, and connections specified in the Topology Editor is transmitted to the master DTM where it is calculated and stored together with the master device configuration.

3.2   Requirements

Prior to the configuration you have to install the hardware.

3.3 Use case PROFINET

3.3.1 Media redundancy

In PROFINET both media redundancy protocols (MRP or MRPD) are optional functionalities to support a highly available communication.

3.3.1.1 MRP rules

Each ring topology with RT devices (and controller) requires an MRP manager device. Only one MRP manager device per ring topology is allowed. All devices of the ring topology must be MRP-capable. The MRP manager is a managed switch. The A2LP131 YOKOGAWA PROFINET IO-Controller does not connect to this MRP network directly.
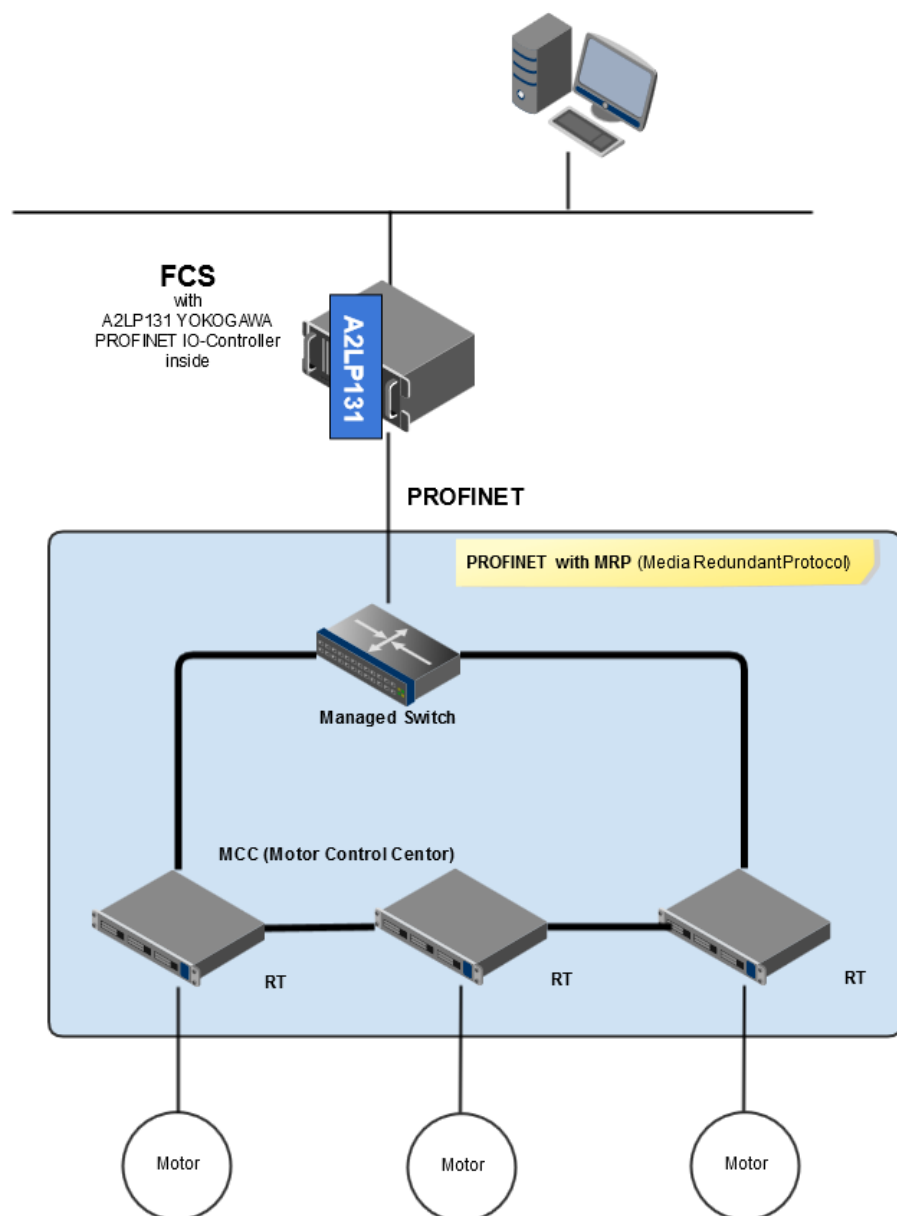
Figure 1: Example of MRP rules

3.3.1.2 PROFINET MRP in the Topology Editor

The data for implementing media redundancy (MRP) can be configured in the Topology Editor.

3.3.1.3 Basic conditions for MRP

Currently, the following basic conditions for a media-redundant communication (MRP) apply for the PROFINET hardware and the PROFINET IO-Controller DTM.

If MRP is set:

- MRP network consists from one ring with one **MRP manager** (this could be a PROFINET device switch which supports the MRP manager role and GSDML file indicates this fact).

- A YOKOGAWA A2LP131 PROFINET IO-Controller device cannot assume the role of an **MRP manager** or of an **MRP client**.

- A PROFINET IO-Device can assume the role of an **MRP manager** (if this role is supported by the device and GSDML file indicates this fact).

- A PROFINET IO-Device assumes the role of an **MRP client**.

- The devices PROFINET IO-Controller, PROFINET IO-Device and PROFINET IO-Controller DTM (for RT) do not support MRPD.

> **Note:**
> • Currently, the Topology Editor supports *one* MRP domain only.
> • The maximum number of allowed devices in a ring is 50.

- Exactly *one* MRP manager switch assumes the role of the MRP manager.

3.4   Starting the Topology Editor

> **Note:**
> To open the Topology Editor, you need a network project with a master device. If you use a YOKOGAWA PROFINET IO-Controller device, create a network project in SYCON.net first.

➢ Open the configuration software.

➢ In the project view select the master device (e. g. for PROFINET the controller device).

➢ Open the context menu (in SYCON.net right click on the master device).

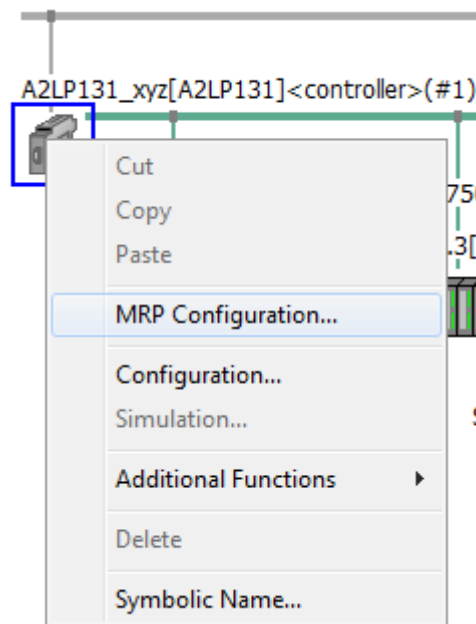➢ Select **MRP Configuration…** .

Figure 2: Open the Topology Editor via the context menu

✎ The topology editor opens.

3.5   Closing the Topology Editor

➢ To close the Topology Editor view, click the cross icon (above left).

> **Note:**
> Check configuration and make corrections if a warning appears on invalid settings. Compare section *Validation of configuration steps* [▸ page 36].

## 3.6	Introduction to the user interface

### 3.6.1	Topology Editor view

The Topology Editor view displays

- the **Topology view** (left) and
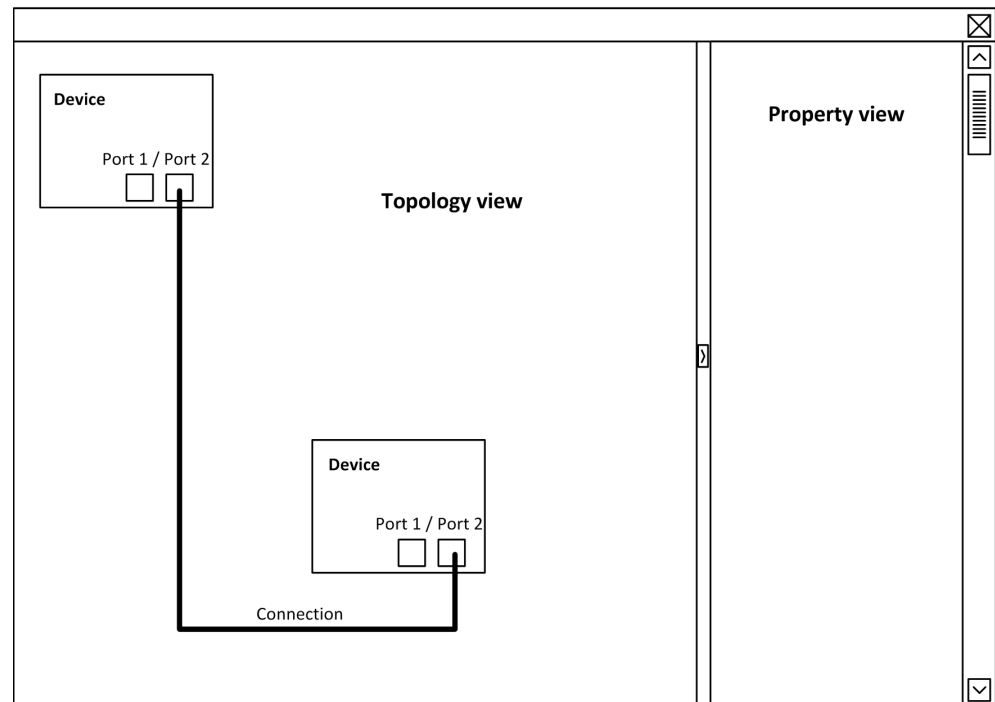- the **Property view** (right).

Figure 3: Topology Editor view (structure of the user interface)

3.6.2   Topology view

The **Topology view** serves as editor window to display and configure the devices and their connections. The ports of each device are visible.
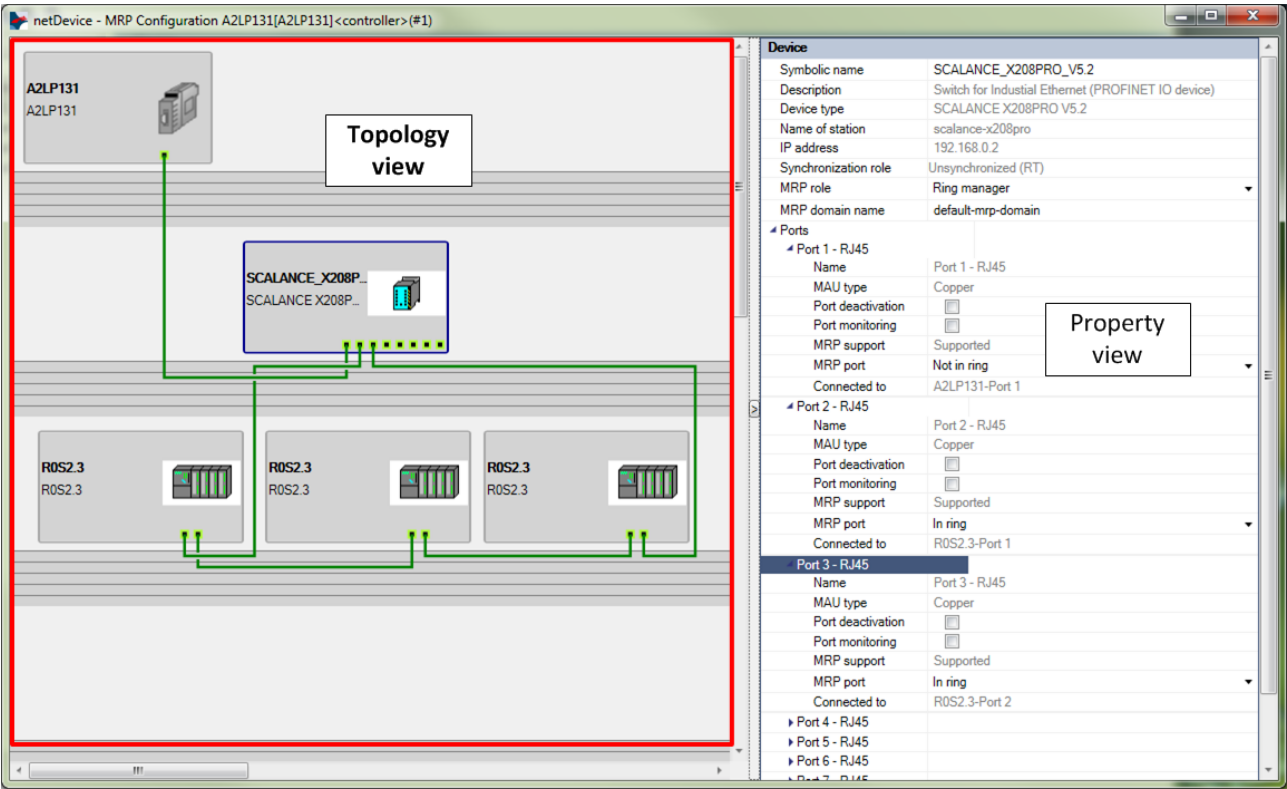

Figure 4: Topology view (example)

3.6.2.1 Zooming or shifting sections

Zooming in (scaling up)

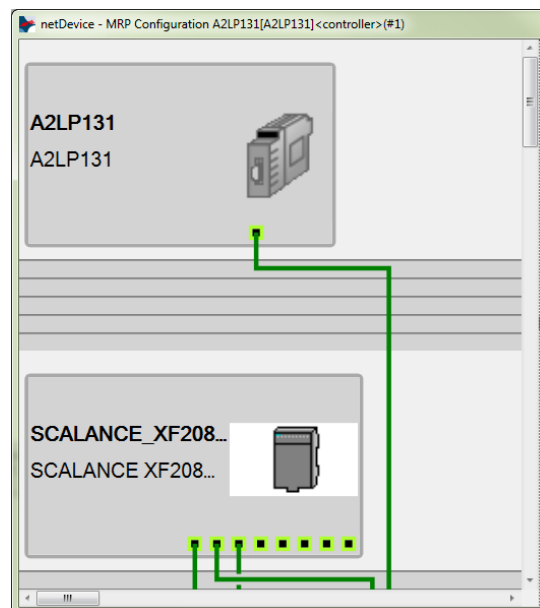➢ Commands (keyboard and mouse): **Ctrl + mouse wheel forward**

Figure 5: Result of zooming in

Zooming out (scaling down)

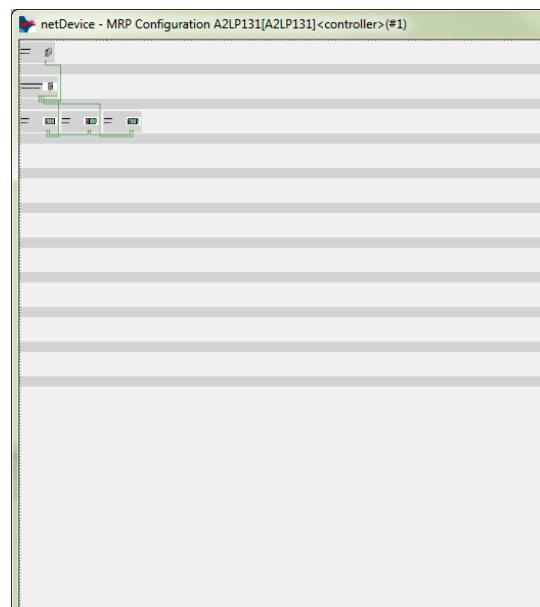➢ Commands (keyboard and mouse): **Ctrl + mouse wheel back**

Figure 6: Result of zooming out

Restoring the 100% view

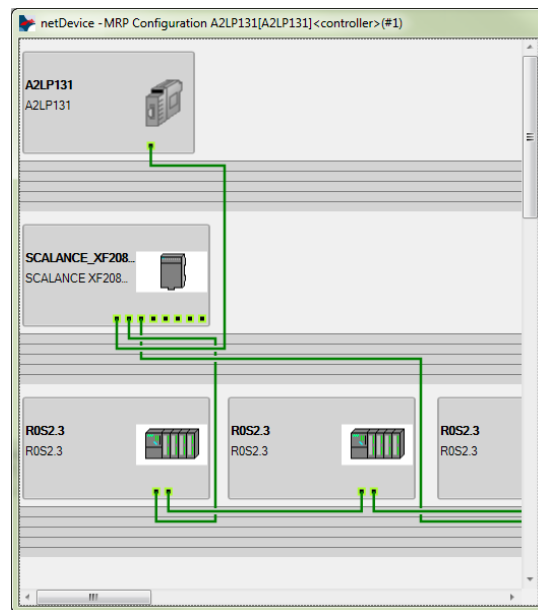➢ Commands (keyboard and mouse): **Ctrl + mouse wheel click**

Figure 7: 100% view restored

Shift section of the window

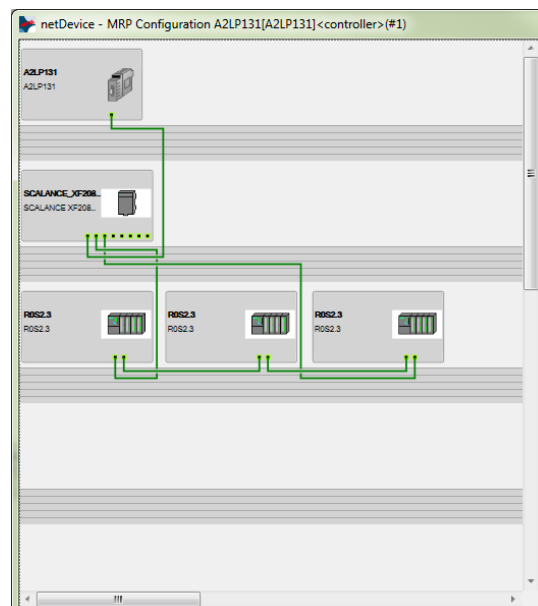➢ Drag the slider to the right/left or up/down to select the required part of the window.

Figure 8: Visible part of the window shifted

Topology editor A2LP131 | Configuring the device topology
DOC181201OI01EN | Revision 1 | English | 2018-12 | Released | Public

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3.6.2.2   Tooltips

If you move your mouse over an item in the user interface, the item name appears.
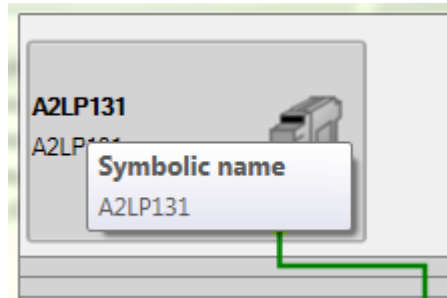

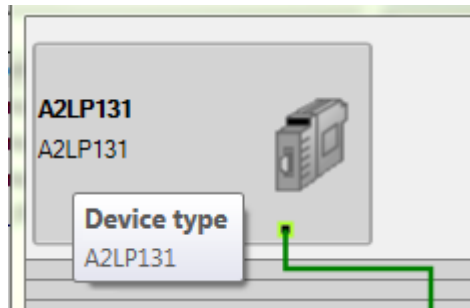*Figure 9: Example tooltip 'Symbolic name' (of the device)*

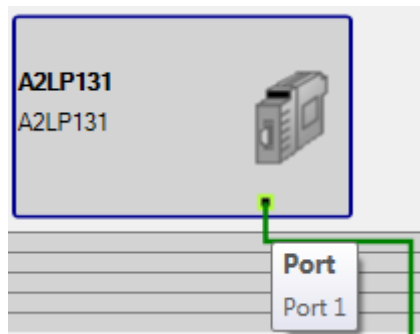*Figure 10: Example tooltip 'Device type'*

Figure 11: Example tooltip 'Port 1'

3.6.3   Property view

The **property view** on the right shows protocol-dependent information on the device or port and allows network-related settings.

> **Note:**
> The descriptions of properties of devices and ports for the PROFINET IO-Controller DTM used in this manual are only examples for this particular use case. If the Topology Editor is used together with another master DTM, the properties of device and ports show other settings that relate to other networks.

3.6.3.1   Displaying properties, hiding or showing property view

Displaying properties

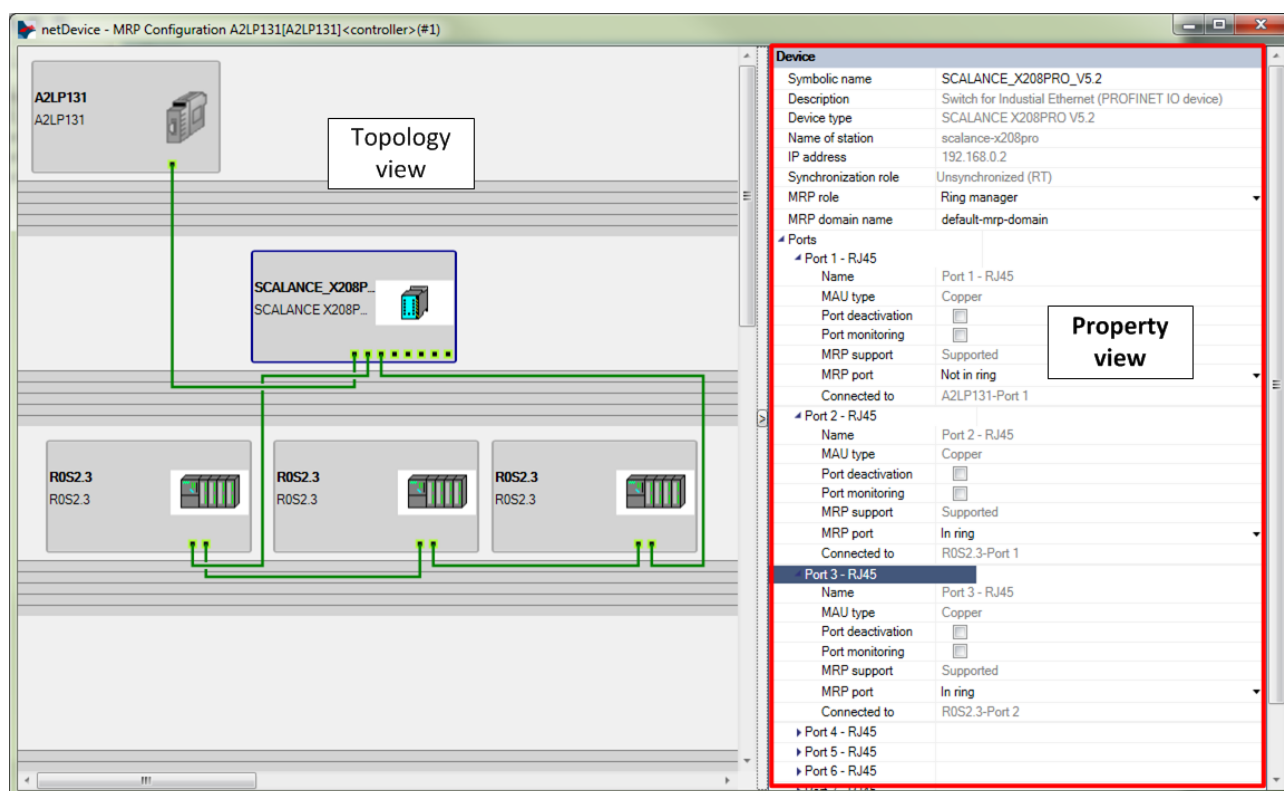➢ To display the properties in the topology view, select the device or the port.

Figure 12: Property view (example)

Hiding or showing property view

➢ Click ⊳ to hide the property view.

➢ Click ⧉ to show the property view.

3.6.3.2 Setting properties

Some properties can be set by editing the property value.

➢ Place the cursor in the field with the value of the property box (for example 'Symbolic name').
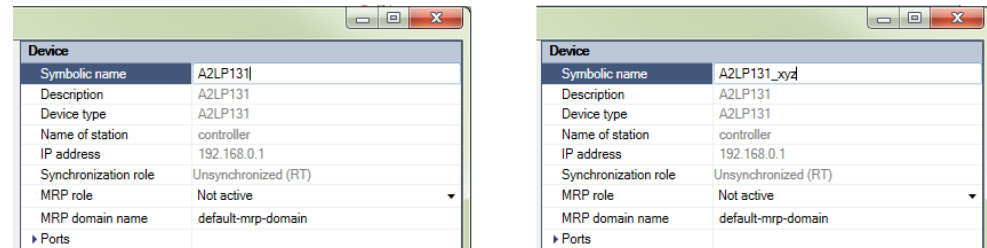
➢ Change the 'Symbolic name'.

Figure 13: Example changing 'Symbolic name' entry

Depending by the specific property settings, a property value can also be selectable from a list.

Input of faulty values for the device or port properties

> **Note:**
> In case of faulty entries to a property field, the field is marked in red. The entry cannot be saved.

Figure 14: Red marking because of wrong entries

4 PROFINET configuration

4.1 Project creation

4.1.1 Example sequence

To configure your network and its topology, proceed as follows:

1. Create the network project with the master device.
2. In the network view, insert all devices in the network project.
3. Start the Topology Editor.
4. In the Topology Editor, shift all devices to arrange the required topology.
5. Make settings in the Topology Editor:
   - ➢ Connect the devices.
   - ➢ Configure properties for devices and ports.

For more information on the configuration of master and devices, read the corresponding operating instruction manuals.

4.1.2 Creating a network project

You first need to create your project configuration in the frame application.

➢ Create a network project.
➢ Configure the master device.
➢ Possibly configure a switch device.
➢ Configure the slave devices.

> **Note:**
> The maximum number of allowed devices in a ring is 50.
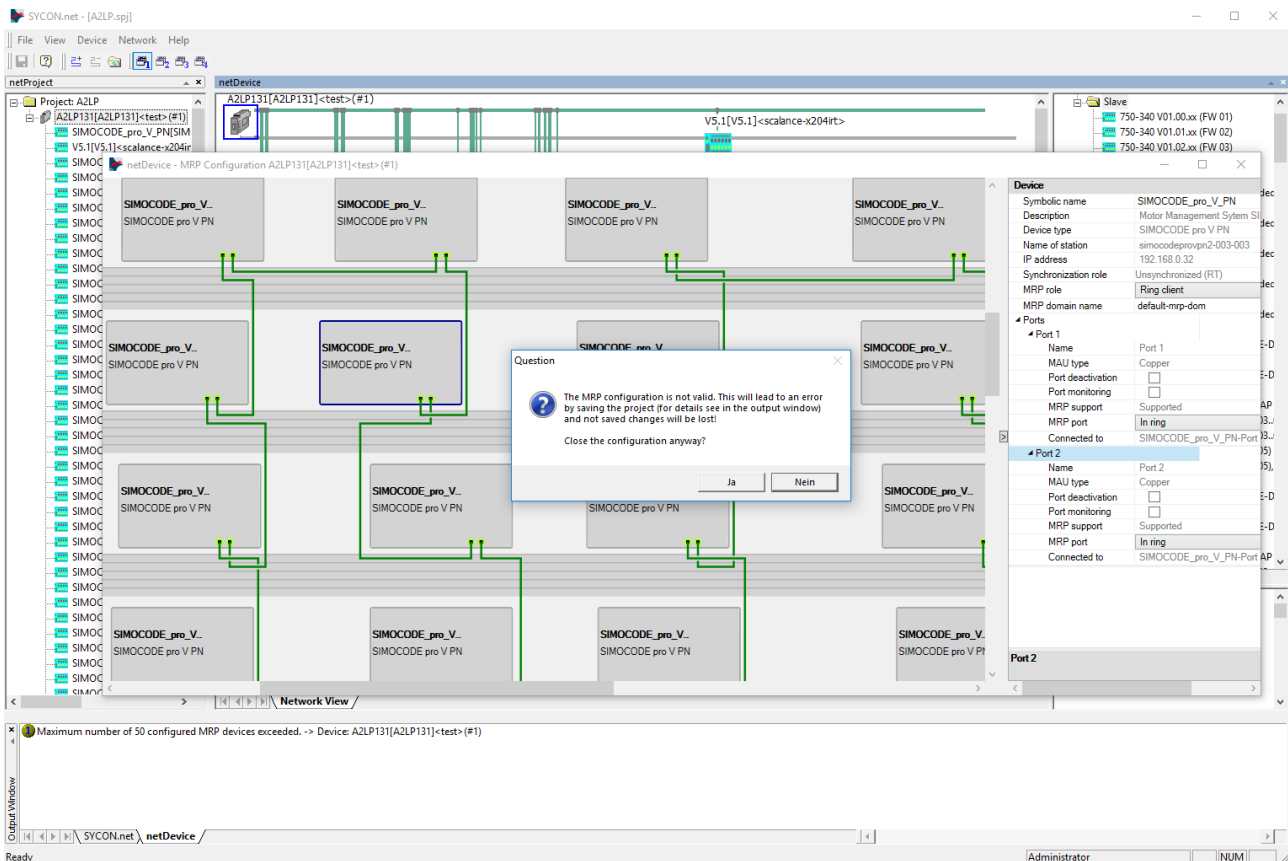
MRP configuration example

Figure 15: MRP configuration error message - 50 device maximum (example)

If more than 50 devices are configured in a MRP ring configuration, the configuration can not be saved, the MRP configuration not valid message is displayed as well as a message in the DTM output window "Maximum number of 50 configured MRP devices exceeded".

4.2   Arranging devices in the topology view

> **Note:**
> To open the Topology Editor, you need a network project with a master device.

➤ Start the Topology Editor via context menu **MRP Configuration**… .

↳ All devices of a created network project with a master device, possibly a switch device and the slave devices are displayed in the topology view.

Arranging or shifting devices

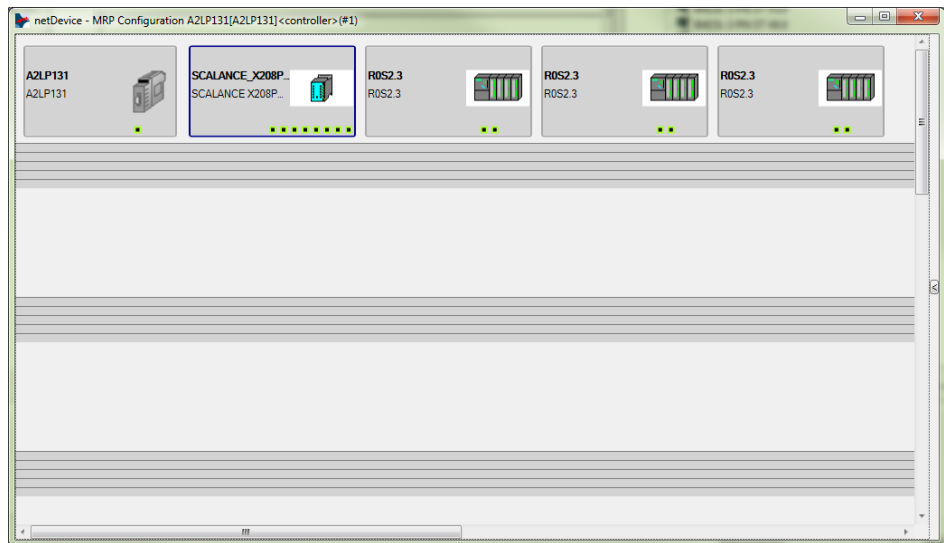➤ In the topology editor select the device you wish to shift.

Figure 16: Switch selected in the topology view (example)

↳ The selected device has a blue frame.

➤ Keep the left mouse button pressed and drag the device to the desired position in the topology view.

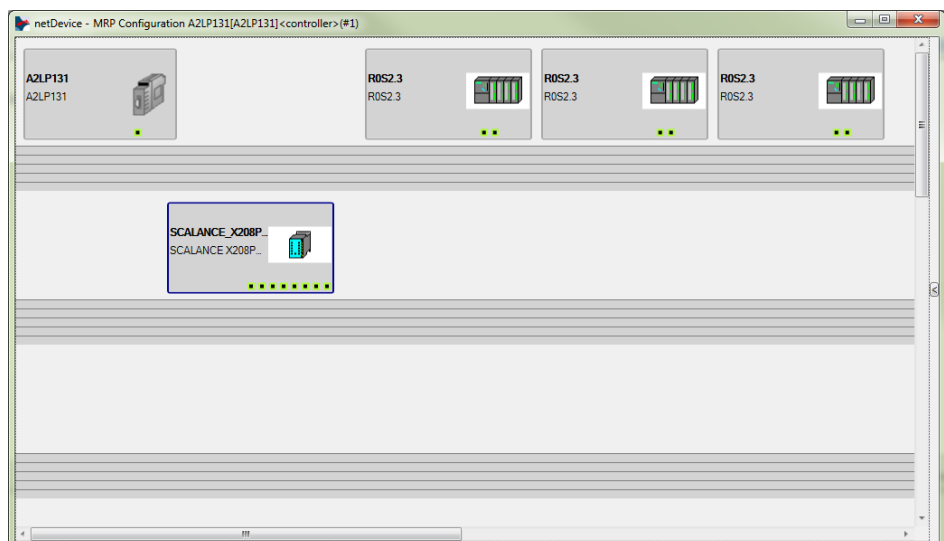↳ The device is located at the new position.

Figure 17: Slave device moved in the topology view (example)

➤ Arrange all devices in the Topology Editor as desired.
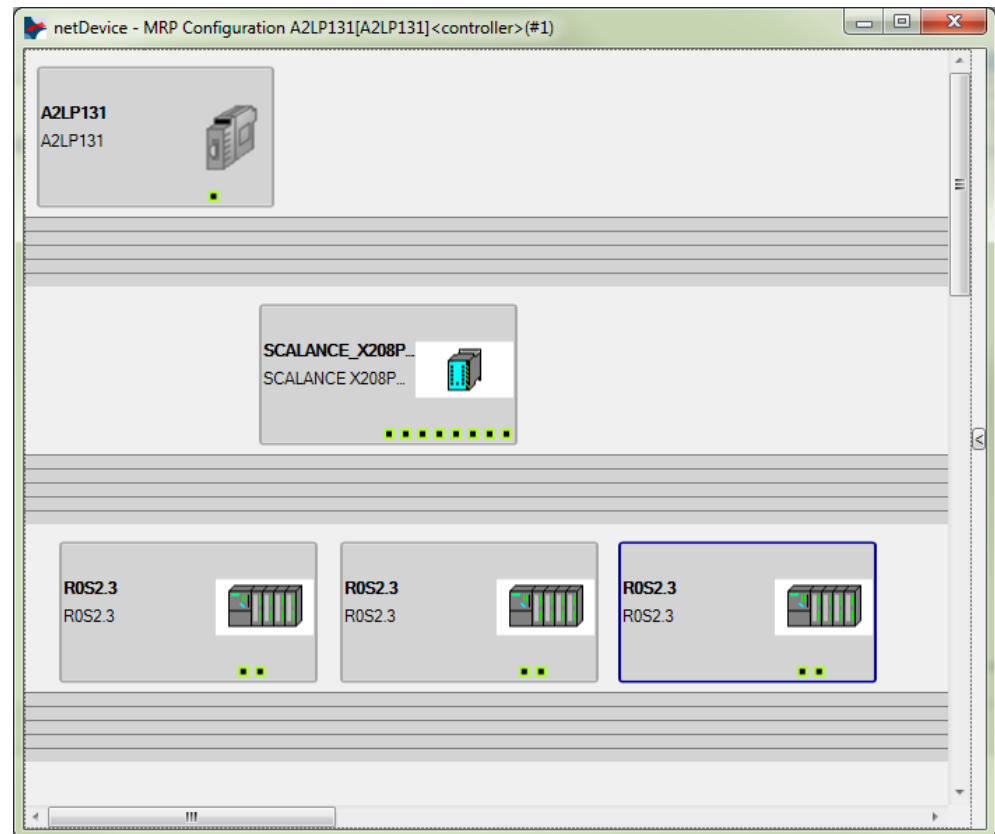
Figure 18: Arranged master device, switch device and slave devices in the topology view (example)

4.3   Connecting devices

The Topology Editor allows the connection of IO devices. To connect two devices in the configuration, connect their ports.

Connecting devices

➢   In your configuration connect the intended port of device 1 with the intended port of device 2.

Via 'port 1' in the topology view, connect 'channel 0' of the Ethernet connector.
Via 'port 2' in the topology view, connect 'channel 1' of the Ethernet connector.
When establishing the connection observe the general rules (for example, for auto-crossover and instructions in the manual for your device).

Deactivated ports cannot be used (see *Port properties* [▷ page 32] / 'port deactivation').

➢   Click on the port ■ of the first device and keep the mouse button pressed.

➢   To create a connection, move the pointer to the port ■ of the second device and release the mouse button thereafter.

↳   The connection is dispalyed as a green line in the Topology Editor:
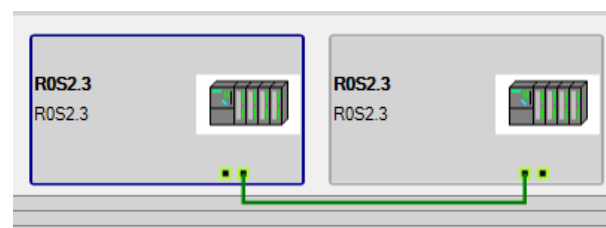
Figure 19: Graphical illustration of a connection between two devices in the Topology Editor

> **Note:**
>
> No connection will be established if you try to connect ports with red marks ■. These ports can neither be connected nor included within the communication.
>
> No connection will be established if you try to connect a port to a port, the 'Port deactivation' setting of which is checked or 'Not supported'. The symbol of such a port then is marked with a red frame line ■.

4.4   Removing a device or connection

Devices or connections configured in the Topology Editor can be removed from the configuration.

> **Note:**
> Master devices cannot be deleted in the Topology Editor.

Removing device

➢ In the Topology Editor select the device you wish to delete.

➢ Press the 'Delete' key.

➢ Or right click on the device to open the context menu.
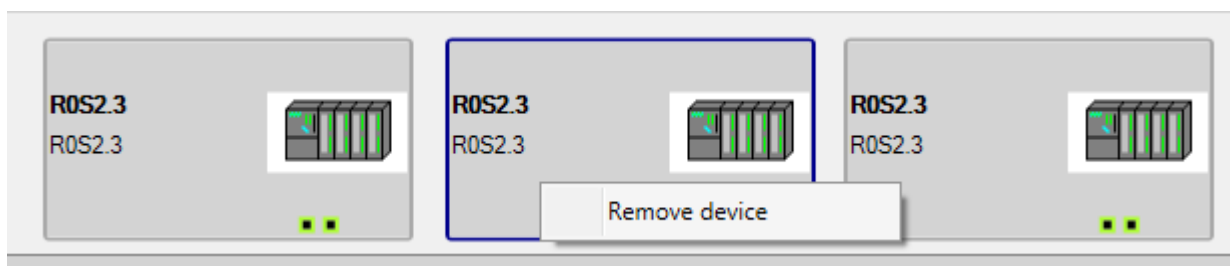
➢ And click **Remove device**.

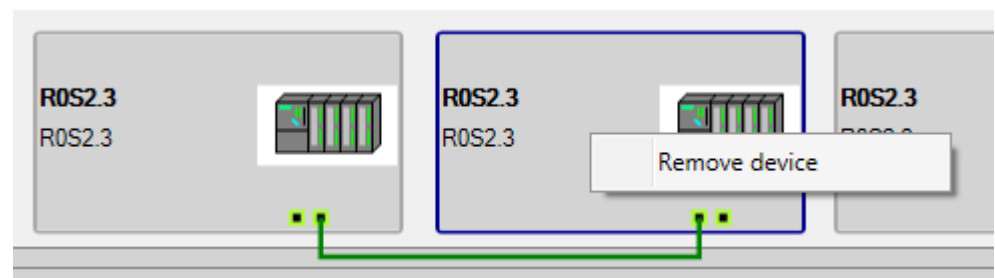*Figure 20: Remove device (example of an unconnected device)*

Figure 21: Remove device (example of an connected device)

✎ The request pops up and asks if you want to delete the device.
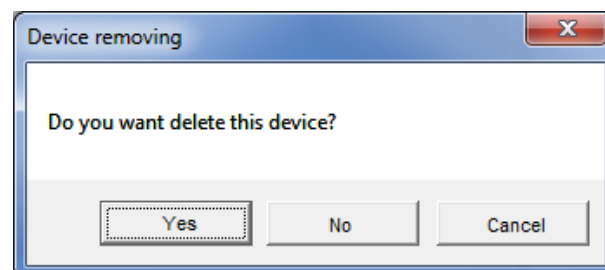
Figure 22: Request whether you want to delete the device

➢ Click **Yes**.

✎ The device will be deleted along with its connections if there are any.

Deletion of master device impossible

The master device cannot be deleted from the topology.
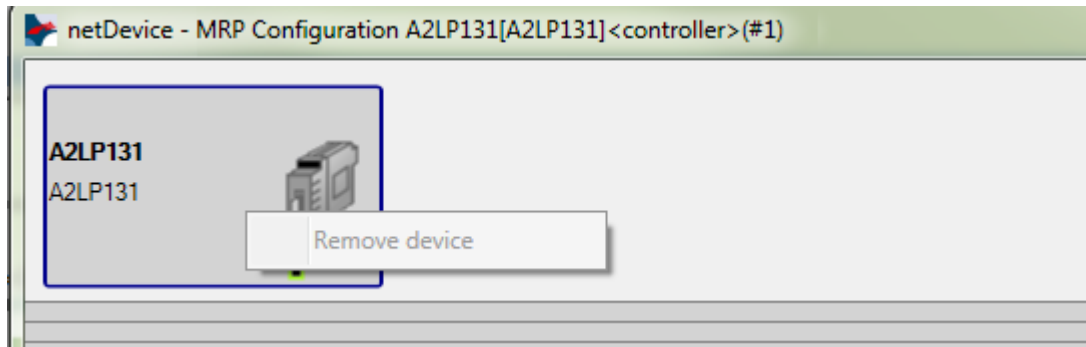
Figure 23: Deleting the master device is not possible (example of a connected device)

Remove connection

➢ In the Topology Editor click on the connection you want to remove.

↳ The connecting line is displayed in blue.

➢ Press the 'Delete' key.

➢ Or right click on the connection to open the context menu.

➢ And click **Remove connection**.

Figure 24: Remove device (example of a not connected device)

⇨ The connection is removed.

4.5   Properties

The properties of device, port and connection required for the topology of a network configuration are displayed in the property view. Here you can also configure the settings of cable lengths, cable material or switching delays, etc., required for a PROFINET IO-Controller DTM.
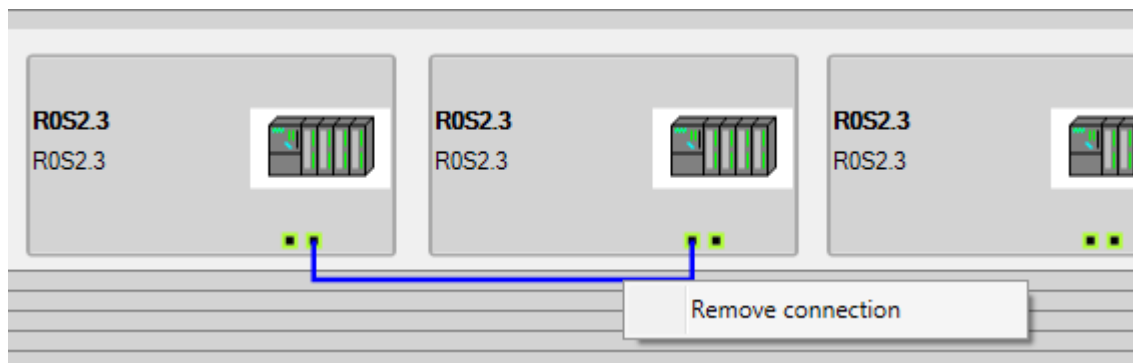
4.5.1   Device properties

The device property view shows general and bus-specific parameters of the devices and allows their configuration.

When configuring PROFINET IO, correct device identification data is displayed: 'Symbolic name', 'Description' (text info from the GSDML file), 'Device type' (physical device name) and 'Name of station' (network name of the PROFINET IO-Controller station). Additionally the device's 'IP address' is displayed depending from the settings made in the controller DTM.

Viewing device properties

➢ In the topology view select the device whose properties you wish to display.

↳ In the property view, the properties of this device are displayed. See also Properties view.

Device properties

Figure 25: Devices properties (example A2LP131)

Figure 26: Devices properties (example SCALANCE_X208PRO_V5.2)

Meaning	Meaning	Value range/value
Symbolic name	Freely editable name of the PROFINET IO-Controller device or the PROFINET IO-Device which can also be changed in the DTM or via the context menu.	Freely editable
	In the PROFINET IO-Controller DTM, the setting can be made under 'Controller network settings' or 'Device table' each under 'Description'.	
Description	GSDML element module info	**
	This element contains human-readable text information about the device.	
Device type	Name of the physical device (also named as 'Device name'). The name is stored in a non-volatile memory of the device.	**
Name of station	**Network name of the PROFINET IO-Controller station or network name of the PROFINET IO-Device station**	**
	The name of station is only displayed here.	
	For the PROFINET IO-Controller the name of station is set in the PROFINET IO-Controller DTM (in SYCON.net under 'Controller network settings').	
	For the PROFINET IO-Device, the name of station is set directly in the configuration tool for the PROFINET IO-Device device (for SYCON.net in the PROFINET IO-Controller DTM under 'Device table').	
	Information on the approved marks, see section *Name encoding* [▶ page 38].	
IP address	IP address of the PROFINET IO-Controller station or PROFINET IO-Device station	**
	The IP address is only displayed here. It is set in the PROFINET IO-Controller DTM (under 'Controller network settings' or 'IP address table').	
	Note: This field may be empty in case the setting 'No DCP SET' is selected in the 'IP address table' in the PROFINET IO-Controller DTM.	
Synchronization role	The display 'Unsynchronized (RT)' indicates that this device does not support IRT communication and that the data exchange to this device cannot be synchronized.	Unsynchronized (RT)
MRP role	Refer to *MRP properties* [▶ page 34].	
MRP domain name	Refer to *MRP properties* [▶ page 34].	

Table 1: PROFINET IO device properties

** cannot be edited in the Topology Editor

4.5.2 Port properties

The port property view shows general and bus-specific parameters of the ports and allows their configuration.

For each port of the PROFINET network devices, the following parameters are displayed: 'Name' (of the port), 'MAU type', 'Port deactivation' and 'Connected to'. For the parameters MRP support and MRP port, see section *MRP properties* [▶ page 34].

A single MAU type or media converters must be used within the network for the RT communication.

Viewing port property

➢ To display the port properties in the topology view, click on the port.

➢ Click ▪.

➪ The port properties are displayed in the property view.

Port properties
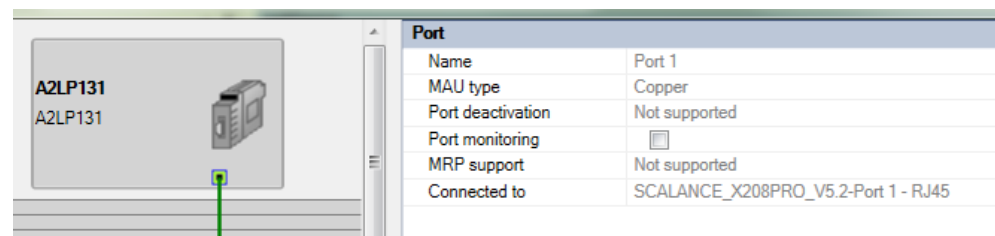
Figure 27: Port properties (example A2LP131 PROFINET IO Controller, without 'Port property')
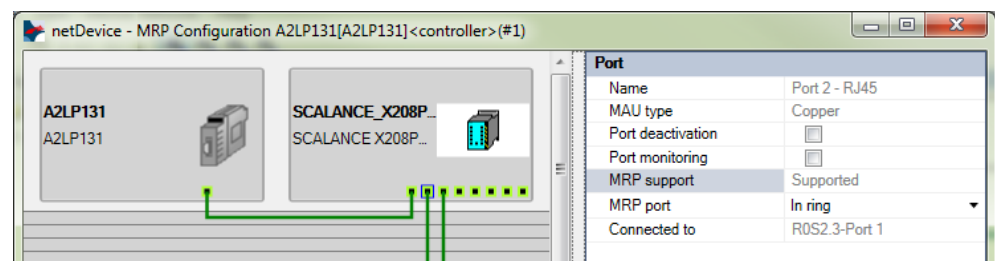
Figure 28: Port properties (example SCALANCE_X208PRO_V5.2, Switch for Industrial Ethernet (PROFINET IO device)

Port properties	Meaning	Value range/value
Name	Name of the device port in the Topology Editor	**
MAU type	MAU type: The specifications for the cable material (media type) are defined in the GSDML file of the specific device or controller. Cable materials can be copper or fiber optic (FO) made from glass or plastic. The setting is made in the PROFINET IO-Controller DTM.	**

Port properties	Meaning	Value range/value
Port deactivation	Setting option to disable or enable the specified port Depending on the settings in the GSDML file, 'Port deactivation' is settable via a checkbox or 'not supported' is displayed. With checkbox: • 'Port deactivation' not checked: The port remains active. A connection can be established via this port. • 'Port deactivation' checked: The port is disabled. No connection can be established via this port. If you try to establish a connection to this port, the symbol for this port is marked with a red frame line. Without checkbox: display 'not supported' (i. e., the 'Port deactivation' cannot be configured).	Checkbox: not checked, checked Default: Not checked Display (without checkbox): Not supported
Port monitoring	This option is used to activate or deactivate the port diagnostics. • ‚Port monitoring' *not* checked: The port diagnosis is disabled. • ‚Port monitoring' checked: The port diagnosis is enabled. Examples: • Link status is monitored, i.e., a diagnosis is generated if link-down occurs. • Attenuation (system reserve) is monitored (only for glass fiber).	Checkbox: not checked, checked Default: not checked
MRP support*	Refer to section *MRP properties* [▶ page 34].	**
MRP port*	Refer to section *MRP properties* [▶ page 34].	**
Connected to	Specifying the symbolic name of the connected device as well as the port name of this device.	**

Table 2: PROFINET IO port properties

*appears only when MRP is supported

**cannot be edited in the topology editor

4.5.3   MRP properties

Media redundant communication

Certain rules must be observed to set up a redundant ring topology. For information on the rules for media-redundant communication in high-availability networks, refer to the MRP rules section.

MRP device properties

The settings required for a media-redundant communication ('MRP role' and 'MRP domain name') can be set for each PROFINET MRP device.

Device property	Meaning	Value range/value
MRP role	Property of the PROFINET interface sub-module format. Specifies the role of the PROFINET interface submodule: 'Manager' or 'Client '.	Not active, Ring client, Ring manager
	To support a media-redundant communication for highly available networks, select the MRP role ,Ring client' or 'Ring manager'. The settings ,Ring client' or 'Ring manager' effect the 'MRP port' setting 'In ring'.	
	If 'Not active' is selected, the device is not in the ring. For the meaning of the MRP roles, see also section MRP rules.	
	If the device does not support media-redundant communication (MRP), 'Not supported' is displayed.	
	Note: For A2LP131 PROFINET IO Controller the MRP role is 'Not active' and is not changeable.	
MRP domain name	Property of the PROFINET interface sub-module format.	Freely editable Identical name for all participants of an MRP domain
	Freely editable name for the MRP domain. The MRP domain includes all devices that are configured as participants in the ring.	
	Important! A uniform **MRP domain name** must be used for all participants in an MRP domain.	
	If the MRP domain name for one participant is changed, the MRP domain names of all other participants of this MRP domain are changed in the same way.	
	The MRP domain name must be written in lowercase.	
	Information on the approved marks, see section *Name encoding* [▷ page 38].	
	Note: MRP domain name is not listed in the device properties view if MRP role is 'Not supported'.	

Table 3: PROFINET MRP device properties

Configure MRP device properties

If media redundancy is supported:

➢ Assign the role as 'MRP client' to the PROFINET IO-Device device: Select **MRP role** 'Ring client'.

➢ Select a PROFINET IO-Device that supports the role as 'MRP manager' and assign the role as 'MRP manager' to this device: Select **MRP role** 'Ring manager'.

➢ If a device is not to be included in the MRP domain, assign the role 'Not active' to this device: Select **MRP role** 'Not active'.

➢ Specify an **MRP domain name**. This name must be the same for all participants in an MRP domain.

MRP port properties

The port property view shows whether MRP is supported ('MRP support') and whether the device port is connected ('MRP port').

The parameters 'MRP support' and 'MRP port' are displayed for each port of the PROFINET MRP network devices.

The implementation of high-availability networks using media-redundant communication is only possible via a ring topology. Without a ring topology, there is no protection against connection breakdown. If an error occurs, the error-free part of the ring can be used as a redundant communication path.

Port properties	Meaning	Value range/value
MRP support*	Indicates whether the device supports media redundancy. This is defined in the GSDML file of the device. Media redundancy (using MRP or MRPD) is an optional functionality in the PROFINET to build a redundant ring topology.	** Supported
MRP port*	Indicates whether a port (according to the definition of the GSDML file) is suitable for a media-redundant communication and whether the port is connected. Display 'In ring' (In the ring): MRP is supported, port is connected Display 'Not in ring' (Not in the ring): MRP is supported, port is not connected **Note:** For A2LP131 PROFINET IO Controller the 'MRP port' parameter is not listed in the port property view.	In ring, Not in ring

Table 4: PROFINET IO MRP port properties

*appears only when MRP is supported
**cannot be edited in the topology editor

4.6   Validation of configuration steps

The DTM or Topology Editor will check all your configuration steps. Incorrect configuration of the topology or incorrect settings for the device or port properties will trigger warnings.

- **Incorrect configuration of the topology:** A warning question appears and a warning message appears in the DTM output window.

- **Input of faulty values for the device or port properties:** In the property view of the Topology Editor the faulty value is marked in red and cannot be saved.

- **Failures during port connection:** Ports of devices that have a different MAU type cannot be connected to each other. The port symbols appear in red. Deactivated or not supported ports cannot be connected to other ports. The port symbol appears with a red frame line.

4.6.1   Incorrect configuration or faulty settings

Incorrect configuration of the topology or incorrect settings for the device or port properties will trigger a warning 'Question' and a warning message in the DTM output window, when you try to close the Topology Editor window.
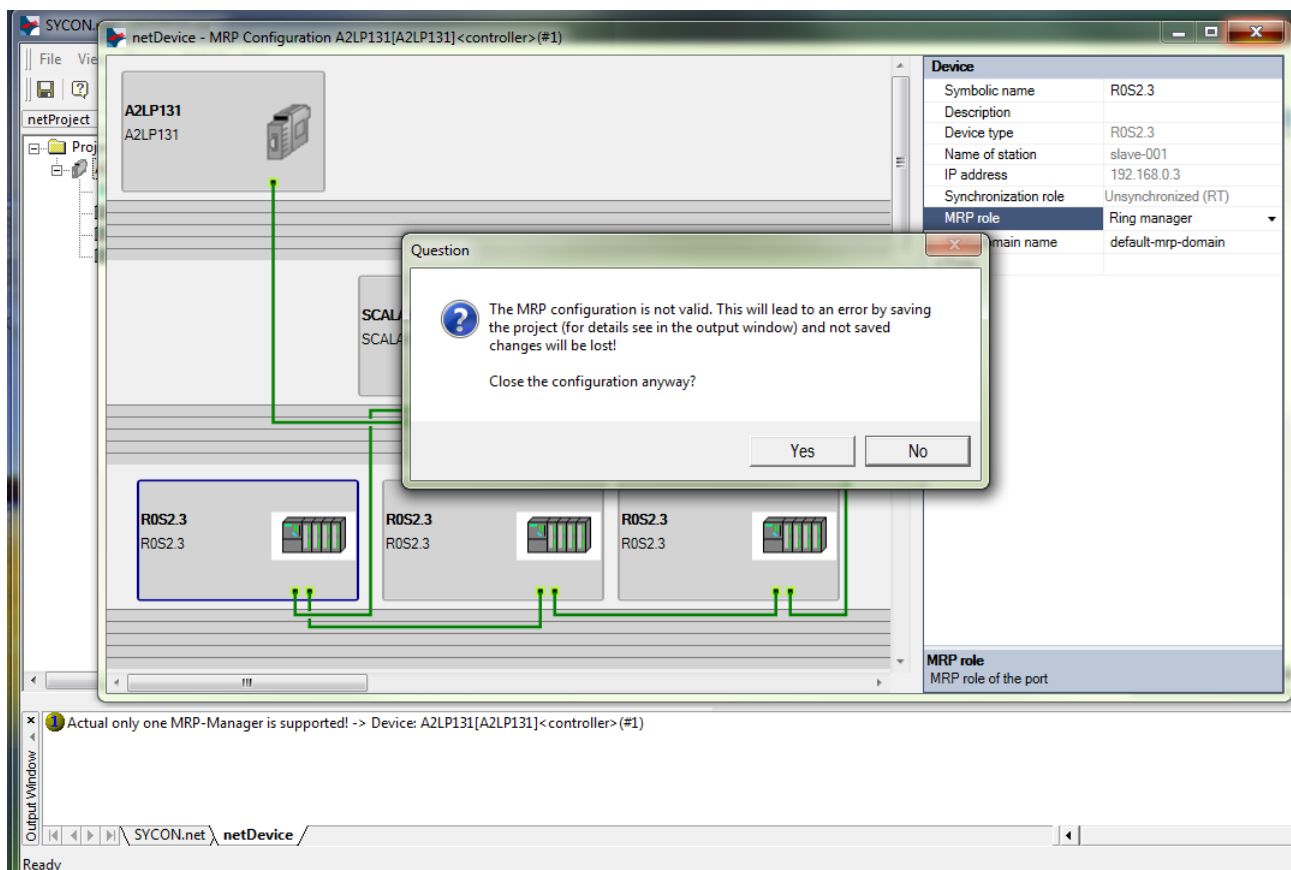

Figure 29: MRP configuration not valid warning (example)

Additional examples for warnings in the DTM output window:

- MRP port configuration of device [*device name*] is not valid: Connected MRP port(s) of device is not in ring. -> *device name*

- Inconsistent MRP configuration for device [*device name*]. For a MRP client/manager, its 2 MRP ports exactly must be configured as [In ring] and connected to an MRP ring. -> *device name*

> **Note:**
>
> You cannot save an invalid configuration in the project! If you close the MRP configuration not valid warning with 'Yes' and you try to save the project, the error message 'Due to the errors in the configuration, the project can not be saved!'.
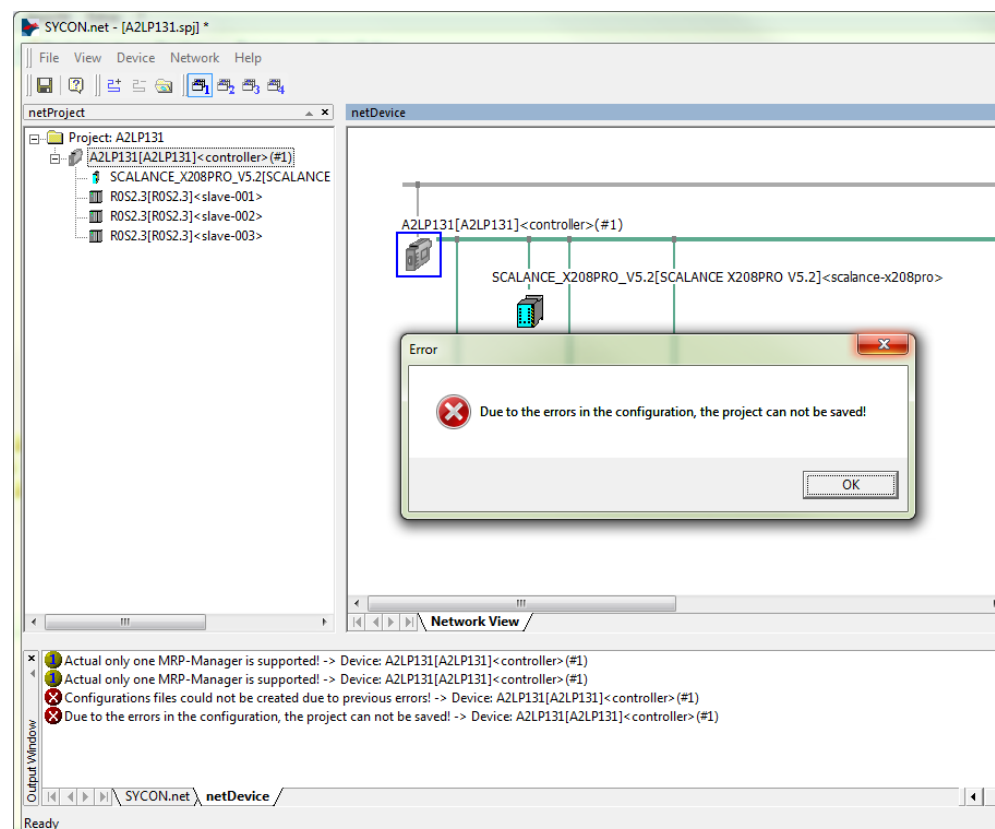
Figure 30: Error message 'Due to the errors in the configuration, the project can not be saved!' (example)

4.6.2 Failures during port connection

- Ports the symbol of which are marked in red ▪ are excluded from the communication, because it is impossible to combine or connect devices of different MAU types, e. g. copper and fiber optic material (FO).

- If you try to connect a port to a port, the 'Port deactivation' setting of which is checked or 'Not supported', the port symbol is marked with a red frame line ▪ and no connection can be established to this port.

Topology editor A2LP131 | Configuring the device topology
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5   Annex

5.1   Name encoding

The name is an OctetString with 1 to 240 octets. A name can contain one or more labels separated by a dot [.].

The definition of IETF RFC 5890 and the following syntax applies:

- 1 or more labels, separated by [.]
- Total length is 1 to 240
- Label length is 1 to 63
- Labels consist of [a-z0-9-]
- Labels do not start with [-]
- Labels do not end with [-]
- Labels do not use multiple concatenated [-] except for IETF RFC 5890
- The first label does not have the form "port-xyz" or "port-xyz-abcde" with a, b, c, d, e, x, y, z = 0..9, to avoid wrong similarity with the field AliasNameValue
- Station names do not have the form a.b.c.d with a, b, c, d = 0...999

5.2   References

[1] Application Layer protocol for decentralized periphery and distributed automation, Technical Specification for PROFINET, Version 2.3Ed2MU2, February 2015, Order No: 2.722, PROFIBUS Nutzerorganisation e.V., Karlsruhe

[2] Operating instruction manual, DTM for PROFINET IO-Controller/Master devices, Doc-ID: DOC060302OIXXEN, PROFINET IO Controller DTM OI XX EN.pdf

[3] Operating instruction manual, Generic DTM for PROFINET IO-Device devices, Doc-ID: DOC060305OIXXEN, PROFINET IO-Generic Device DTM XX EN.pdf

List of figures

List of tables

Glossary

DTM	Device Type Manager: Software module with graphical user interface for the configuration and/or for diagnosis of devices
FDT	Field Device Tool: FDT specifies an interface, in order to be able to use DTM (Device Type Manager) in different applications of different manufacturers
IP address	Identifies a device or a computer within an IP-based network and is defined in the Internet Protocol Version 4 (IPv4) as a 32-bit number. For ease of notation the address is usually divided into four 8-bit numbers represented in decimal notation and separated by points: a.b.c.d. Each letter stands for an integer value between 0 and 255, e.g. 192.168.30.16. However, not all combinations are allowed, some are reserved for special purposes. The IP address 0.0.0.0 is defined as invalid.
MAU	Medium Access Unit: Transmitting and receiving device for signals (for feeding signals into and extracting them from the media). On the side of the network medium (cable), the device is the interface for connecting network stations.
MRP	Media Redundancy Protocol: Data network protocol for high-availability networks. The protocol is defined in standard IEC 62439 and suitable for most Industrial Ethernet applications.
MRPD	Media Redundancy for Planned Duplication: is a method for the bumpless changeover of the IRT telegrams (high-availability). The bumpless changeover is ensured, as the cyclic IRT data is sent via both ways of communication in the ring, i. e. if there is no failure in the network, the receiver will get the same IRT telegram twice. The first telegram will be used; the second one will be discarded.
PROFINET	Communication system for Industrial Ethernet designed and developed by PROFIBUS & PROFINET International (PI) which uses some mechanisms similar to those of the PROFIBUS field bus

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