



FAQ • 03/2015

How do I go online?

SIMOTION & SINAMICS

This article originates from the Siemens Industry Online Support. The terms of use specified there apply (www.siemens.com/terms_of_use).

Security information

Siemens provides products and solution with industrial security functions that support the secure operation of plants, solutions, machines, equipment, and/or networks. They are important components of a holistic industrial security concept. With this in mind, Siemens products and solutions undergo continuous development. Siemens strongly recommends that you regularly check for product updates.

To ensure the secure operation of Siemens products and solutions, it is necessary to take suitable preventive measures (e.g. cell protection concept) and integrate each component into a state-of-the-art holistic industrial security concept. Third-party products that may be in use should also be considered. For more information about industrial security, visit <http://www.siemens.com/industrialsecurity>.

To stay informed about product updates as they occur, sign up for a product-specific newsletter. For more information, visit <http://support.automation.siemens.com>.

Table of contents

1	Overview	4
2	Establishing an online connection via Ethernet	7
2.1	Selecting the PG/PC interface.....	8
2.2	Setting the Ethernet interface on the PG/PC (Windows)	11
2.3	Checking Windows IP address(es) (ping).....	13
2.4	Configuring the access point.....	15
2.4.1	... S7ONLINE	15
 NetPro configuration for routed online connections.....	15
 flexible online access without NetPro configuration	17
2.4.2	... DEVICE	20
 manually adjusting the DEVICE access point	22
 automatic setting for all accessible nodes.....	26
2.5	“Accessible nodes” function	29
3	Tips and tricks	34
3.1	... for creating a new SIMOTION project	34
3.2	... for the first download to a SIMOTION control.....	36
3.3	... for an online connection through a firewall.....	37
3.4	... for going online without an existing project.....	38
3.5	... for reading SIMOTION diagnostic data	39
3.6	... for comparing online and offline projects	41
3.7	... for online access via NAT	42
4	Establishing an online connection via PROFIBUS	43
5	Addresses for the factory setting	46
6	Contacts.....	48

1 Overview

With SIMOTION (and SINAMICS), great importance was placed on the flexibility of the choice for online access. You can choose from the following interfaces on the target device to go online with SIMOTION SCOUT (or STARTER):

- Industrial Ethernet (e.g. commissioning interface X127)
- PROFINET IO (e.g. X150)
- PROFIBUS DP (e.g. X126) or MPI
- USB (with SINAMICS G only)

This flexibility gives you the option of selecting appropriate online access (except via USB) even in the case of remote access (e.g. via teleservice adapter).

This access point, which is configured once, enables you to use routing to reach other controllers and drives connected to the superimposed controller via PROFIBUS/PROFINET.

To benefit from these options, however, an online access point has to be configured during initial commissioning and this configuration data loaded to the controller.

Online access via NAT

If you want, for example, to establish an online connection via remote access to modules that are located behind a router (e.g. SCALANCE S) that uses the NAT (Network Address Translation) router function, the online connection to the device can be established by selecting the alternative access point DEVICE.

The procedure is described in detail in Chapter 2.4.2.

S7 routing

Since a SIMOTION control supports the S7 routing function between all interfaces, you can connect the PG/PC to any interface (e.g. X150, PROFINET, or Ethernet) and still reach controls and drives that are connected to this SIMOTION control via another interface (e.g. via X126 or PROFIBUS).

Going online via a routed online connection is described in detail in Section 2.4.

Note

S7 routing is supported by all SIMOTION modules.

A list of the SIMATIC modules that support the S7 routing function can be found here:

<http://support.automation.siemens.com/WW/view/en/584459>

S7-1500 modules that support S7 routing can be found here:

<http://support.automation.siemens.com/WW/view/en/81659450>

Data record routing

Data record routing is a function of SIMATIC modules for accessing parameters and functions of field devices on the PROFIBUS. In other words, data record routing only includes the routing of Ethernet, PROFIBUS, or MPI to another PROFIBUS network.

This function is particularly important in the **SINAMICS G120** drive from firmware versions **V4.3.2 to V4.6** since these drives can only be reached via a direct connection or by means of data record routing.

Note

A detailed list of the SIMATIC modules (CPUs and CPs) that support the data record routing function is available here:
<http://support.automation.siemens.com/WW/view/en/7000978>

SIMOTION controls do not generally support data record routing, but only S7 routing. Therefore, a routed online connection cannot be established via a SIMOTION control to the SINAMICS G120 drive (firmware versions V4.3.2 to V4.6).

Note

The SINAMICS G120 drive can be accessed again via S7 routing as of firmware version V4.7. In other words, even if the online connection is routed via a SIMOTION control.

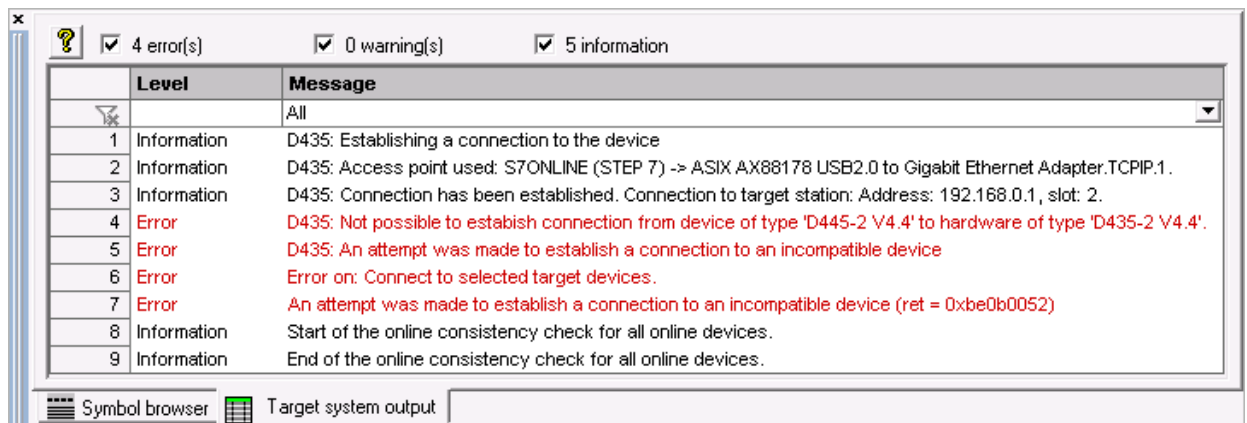
Note

A target drive (e.g. SINAMICS drive) does not have to support the S7 or data record routing function to go online since this device does not have to transfer the information it receives.

Possible error causes when going online

If an attempt to establish an online connection to a target device is terminated with an error message, a detailed error description can be found in the "Target system output" window of SIMOTION SCOUT (or STARTER).

Fig. 1-1: Detailed error description when going online



This error description should allow you to isolate the cause of the error. Perform the following comparisons:

1. The configured and the existing device type (see Fig. 1-1)
2. The configured firmware version and the firmware version that exists on the target device

To be able to go online, these versions must match.

Note

In the event of an error when attempting to go online, it is always recommended to determine whether the target device can even be reached with the “Accessible nodes” function (see Section 2.5).

Further necessary configuration steps for going online are described in the following section and must be taken into account.

2 Establishing an online connection via Ethernet

You establish an online connection via Ethernet with SIMOTION SCOUT (or STARTER) by:

1. Selecting the PG/PC interface
2. Setting the Ethernet interface on the PG/PC (Windows)
3. Checking Windows IP address(es) (ping)
4. Configuring the access point
5. Using the "Accessible nodes" function to determine the modules with which an online connection can be established

Note

The commissioning interface (X127) on the SINAMICS S120 drive is released for going online via SIMOTION SCOUT (or STARTER) for:

- **CU320-2 DP from hardware version "C"** and
- **CU320-2 PN from hardware version "A"**

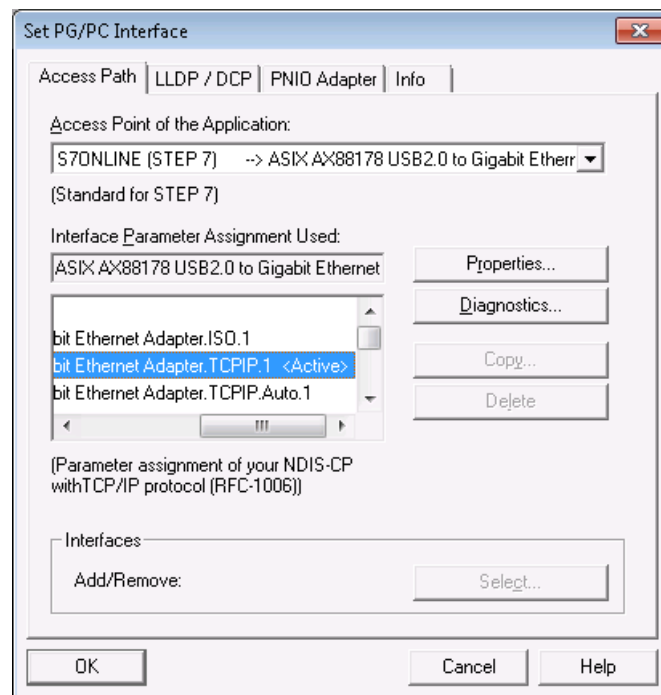
For this purpose, an acyclic connection is established and communicated via the S7 protocol. Further information about the number of free connections via interface X127 can be found in article [52640646](#).

2.1 Selecting the PG/PC interface

The following paragraphs explain how to set the PG/PC interface to establish an online connection to a SIMOTION control or SINAMICS drive via Ethernet (TCP/IP).

Open the settings for the PG/PC interface in SIMOTION SCOUT (or STARTER) by choosing the "Options -> Set PG/PC interface" menu item.

Fig. 2-1: Selecting the PG/PC interface



... depending on the access point

Here, define the desired PG/PC interface (e.g. "<USB Ethernet Adapter>.TCPIP") for the access points

- **S7ONLINE** (standard route) and
- **DEVICE** (alternative access point).

Here, you do not yet define the access point via which the online connection is to be established. This step comes later. This window is only used to select the relevant PG/PC interface for the S7ONLINE and DEVICE access points.

Note

Here, you must ensure that different PG/PC interfaces can be set for the two S7ONLINE and DEVICE access points.

However, the same PG/PC interface can also be assigned to both access points.

NOTICE The PG/PC interface selected in SIMOTION SCOUT (or STARTER) for the S7ONLINE access point is automatically overwritten when you go online if a PG/PC station has been configured in NetPro ...

- with an assigned PG/PC interface
- and active S7ONLINE access (see Fig. 2-5).

This also applies if several projects are open. In other words, another open project with active S7ONLINE access can also overwrite the PG/PC interface settings.

In the case of the S7ONLINE access point, therefore, the PG/PC interface configured and assigned in NetPro has priority. So an online connection can only be established via the PG/PC interface assigned in NetPro.

To go online via another PG/PC interface, you can do one of the following:

- Assign the relevant PG/PC interfaces in NetPro.
- Deactivate the S7ONLINE access in NetPro.
- Use the alternative DEVICE access point.

Note With the S7ONLINE access point, active S7ONLINE access in NetPro is necessary to establish an online connection to target devices that are located in networks other than PG/PC.

... depending on the protocol

When you select the Ethernet interface, you can also select from the following:

- ISO
- TCP/IP
- TCP/IP (Auto)

The **ISO protocol** is not supported by SIMOTION controls or SINAMICS drives.

It is recommended that you select the **TCP/IP without Auto** setting because “virtual” IP addresses are not created automatically by STEP7 in this case.

The correct IP address must be defined in the Windows Ethernet adapter settings.

Alternatively, a **TCP/IP (Auto)** can also be used. Then, you must ensure that, once accessible nodes have been searched for, STEP7 automatically creates “virtual” IP addresses in Windows as applicable.

This has the following advantages:

- The accessible nodes (SIMOTION and SINAMICS) can always be diagnosed (firmware version and SIMOTION diagnostic data).
- To go online, the PG/PC always has an appropriate IP address (after the search for accessible nodes). The user does not have to define this explicitly in Windows.

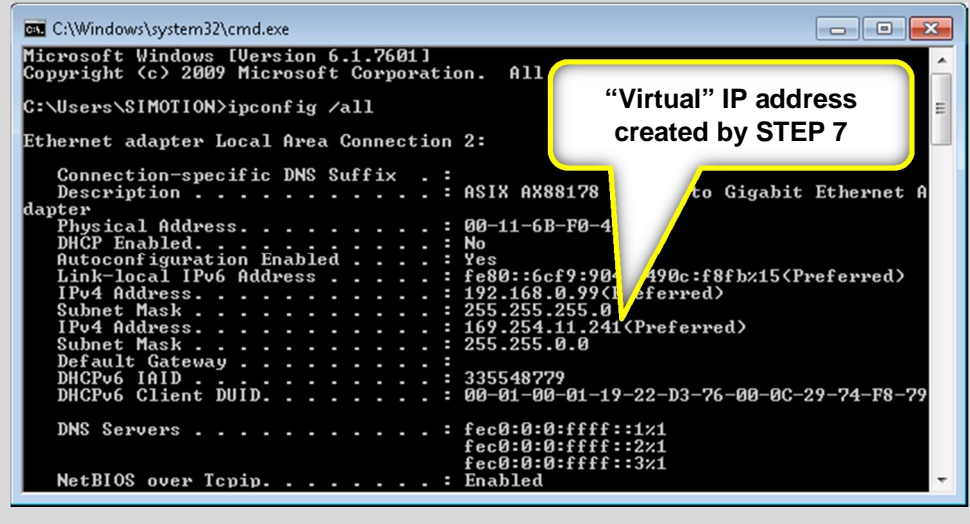
However, the **TCP/IP (Auto)** protocol also has a significant drawback.

- The user cannot influence the “virtual” IP addresses created by STEP7. STEP7 may create an IP address that is already being used by another node (e.g.

another PG/PC that is not visible via “Accessible nodes”). This causes considerable network problems that are not immediately apparent.

Note

You can check the “virtual” IP addresses created by STEP7 by entering “ipconfig /all” in the command line window.



2.2 Setting the Ethernet interface on the PG/PC (Windows)

Open the Windows adapter settings via the Windows Start menu > “Control Panel > Network and Sharing Center > Change Adapter Settings”.

Right-click the relevant Ethernet interface to open its properties.

Select “Internet Protocol Version 4 (TCP/IPv4)” and click “Properties” to display the window shown below.

Here, select the option “Use the following IP address” and enter the required IP address and the corresponding subnet mask (see Fig. 2-2).

IP addresses are subject to certain rules that must be observed during assignment.

One of the most important rules is that a station to be accessed (target device) must be in the same subnet as, for example, the PG/PC from which an online connection is to be established.

The subnet mask serves as a “filter”. If the target IP address can be accessed without violating the subnet mask, the telegram is sent directly to the target device. Therefore, there is no need to define a gateway.

In all other cases, the telegram is sent to a gateway (router).

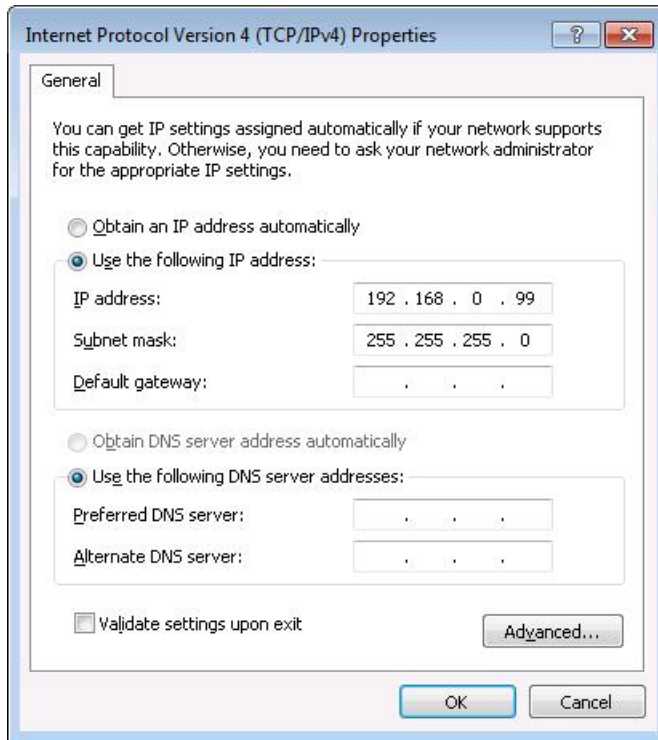
If a gateway (router) has not been entered in the IP settings of the corresponding station, devices outside the subnet cannot be accessed.

Table 2-1: Network classes (IPv4 address range)

Network class	1. Byte (decimal)	1. Byte (binary)**	Network (N) and host (H) component	Subnet mask (standard)	Subnets and nodes per network
A	1 - 127	0000_0001 - 0111_1111	N.H.H.H	255. 0 . 0 .0	128 subnets, 16,777,214 nodes
B	128 - 191	1000_0000 -1011_1111	N.N.H.H	255.255. 0 .0	16,384 subnets, 65,534 nodes
C	192 - 223	1100_0000 -1101_1111	N.N.N.H	255.255.255.0	2,097.150 subnets, 254 nodes
D	224 - 239	1110_0000 -1110_1111	NA		
E	240 - 255	1111_0000 -1111_1111	NA		

** The bits marked red are constant within a network class.

Fig. 2-2: Changing the Windows adapter settings



Note If you need further IP addresses (for other subnets), you can add them by choosing the “Advanced...” button.

NOTICE Ensure that there are no multiple IP addresses in the network.

2.3 Checking Windows IP address(es) (ping)

An easy way of checking the TCP/IP connection to the target device to which you want to establish an online connection is the ping test (ICMP request).

You can carry out a ping test via the Windows Start menu > “Run” or via the command line window. Ensure that the PG/PC is in the same subnet as the target system that you want to ping.

Note

If an IO device (e.g. SINAMICS drive) on the PROFINET interface cannot be pinged, the IO device has not yet been assigned an IP address by the IO controller, which could be due to one of the following reasons:

- The IO controller does not have a connection to the IO device.
- The PROFINET device name of the IO device is incorrect.

The IP address assigned by the IO controller is only temporarily valid on the IO device (up to the next power off/on procedure).

Fig. 2-3: Pinging a target device

```

C:\Windows\system32\cmd.exe
Microsoft Windows [Version 6.1.7601]
Copyright (c) 2009 Microsoft Corporation. All rights reserved.

C:\Users\SIMOTION>
C:\Users\SIMOTION>
C:\Users\SIMOTION>ping 192.168.0.1

Pinging 192.168.0.1 with 32 bytes of data:
Reply from 192.168.0.1: bytes=32 time=2ms TTL=64
Reply from 192.168.0.1: bytes=32 time=11ms TTL=64
Reply from 192.168.0.1: bytes=32 time=16ms TTL=64
Reply from 192.168.0.1: bytes=32 time=16ms TTL=64

Ping statistics for 192.168.0.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 16ms, Average = 11ms

C:\Users\SIMOTION>
C:\Users\SIMOTION>
C:\Users\SIMOTION>ping 192.168.0.1 -t

Pinging 192.168.0.1 with 32 bytes of data:
Reply from 192.168.0.1: bytes=32 time=7ms TTL=64
Reply from 192.168.0.1: bytes=32 time=16ms TTL=64
Reply from 192.168.0.1: bytes=32 time=16ms TTL=64
Reply from 192.168.0.1: bytes=32 time=15ms TTL=64
Reply from 192.168.0.1: bytes=32 time=16ms TTL=64
Reply from 192.168.0.1: bytes=32 time=16ms TTL=64
Reply from 192.168.0.1: bytes=32 time=16ms TTL=64
Reply from 192.168.0.1: bytes=32 time=16ms TTL=64

Ping statistics for 192.168.0.1:
    Packets: Sent = 8, Received = 8, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 7ms, Maximum = 16ms, Average = 14ms
Control-C
^C
C:\Users\SIMOTION>

```

Note

By entering “-t”, the ping test is carried out indefinitely until it is terminated by using the key combination “<Ctrl> + c” or the window is closed.

A noticeably long jitter (lasting several seconds) between the response telegrams is an indication that there is a “poor” online connection. Possible causes of this can be:

- The Ethernet adapter or driver is incompatible.
- There are multiple IP addresses in the network
- There are multiple MAC addresses in the network
- ...

Note

If the target device can be accessed via the ping, an online connection should also be possible.

The only remaining sources of error can then be:

- Incorrect PG/PC interface
- Incorrect access point
- Incorrect firmware on the target device
- Incorrect device type

2.4 Configuring the access point

To establish an online connection to a SIMOTION control (or SINAMICS drive), an access point must be selected and configured in one of the following ways:

- For all devices in NetPro (S7ONLINE)
- Specifically for each individual device (DEVICE)

2.4.1 ... S7ONLINE

The S7ONLINE access point has the advantage that it needs to be configured **only once** in NetPro to establish an online connection to **all** modules in the project (SIMATIC, SIMOTION, SINAMICS, etc.) that are in the same network as the PG/PC.

Since all SIMATIC and SIMOTION controls support the S7 routing function, subordinate target devices (SIMOTION controls and SINAMICS drives) that are connected to a SIMATIC or SIMOTION control can also be accessed.

Prerequisite for this is that the control used is S7 routing-compatible and a PG/PC station with activated S7ONLINE access was configured in NetPro. Only then is the required S7 routing information (e.g. from Ethernet to PROFIBUS) stored in the respective control by downloading the HW configuration.

..... NetPro configuration for routed online connections

1. Open NetPro and – if not yet present – add a new PG/PC station.
2. Double-click the PG/PC station to open its properties.
3. Go to the “Interfaces” tab and – if not yet present – add a new Industrial Ethernet interface.
4. Connect it to the corresponding subnet via which you want to go online and assign an IP address for the PG/PC station. This IP address is not essential to go online and is merely used as a placeholder for assigning further IP addresses.
5. Go to the “Assignment” tab and assign the desired Ethernet interface to this PG/PC station (e.g. “<USB Ethernet Adapter>.TCP/IP”).
6. To route through controls via S7 routing, S7ONLINE access must have been activated (see Fig. 2-5). As a result, the connection line to the PG/PC station is shown in yellow in NetPro.
This HW configuration must be loaded once into the control.

2 Establishing an online connection via Ethernet

Fig. 2-4: Configuring the S7ONLINE access point in NetPro

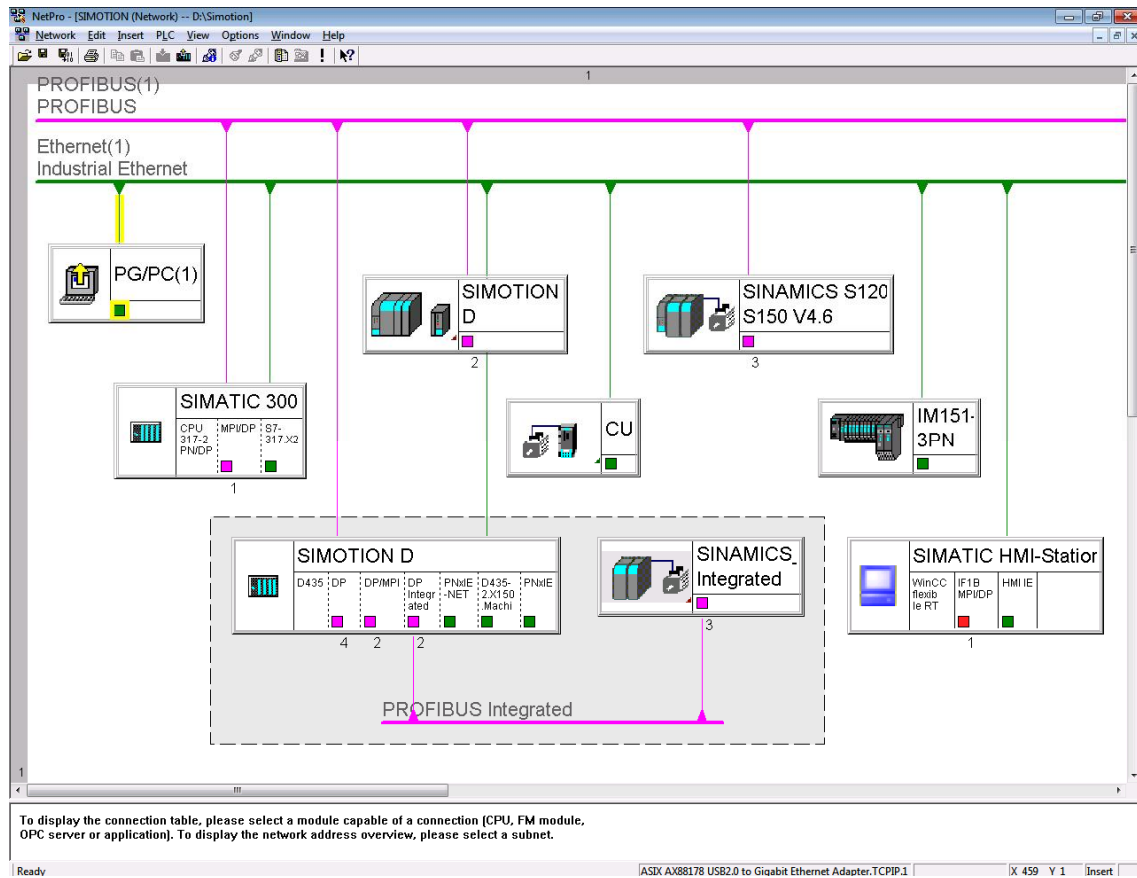
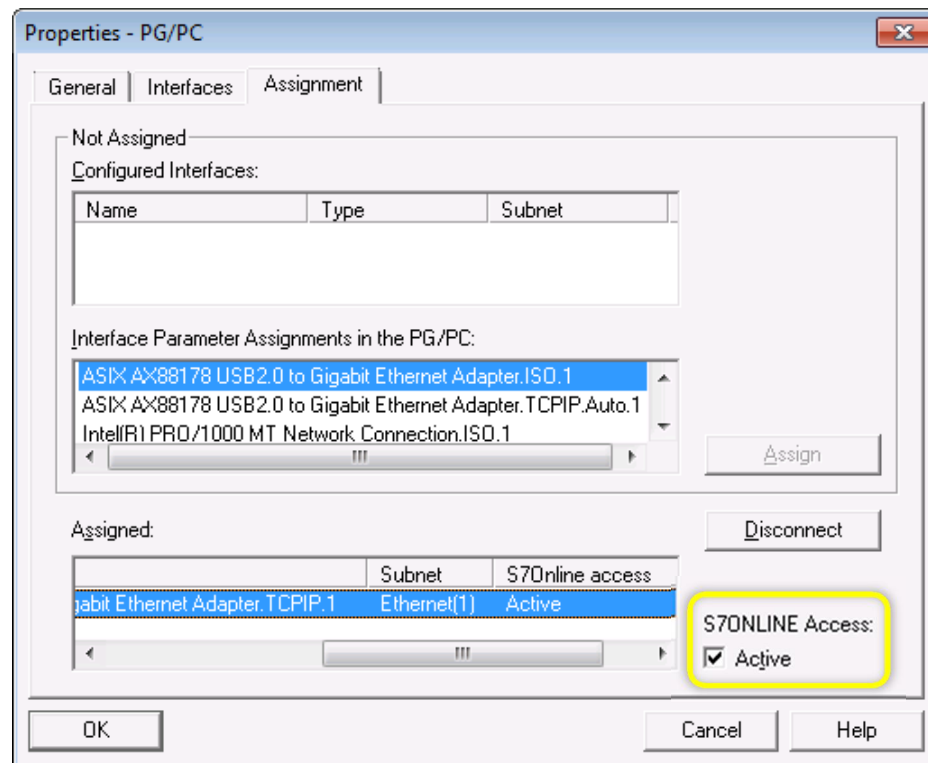


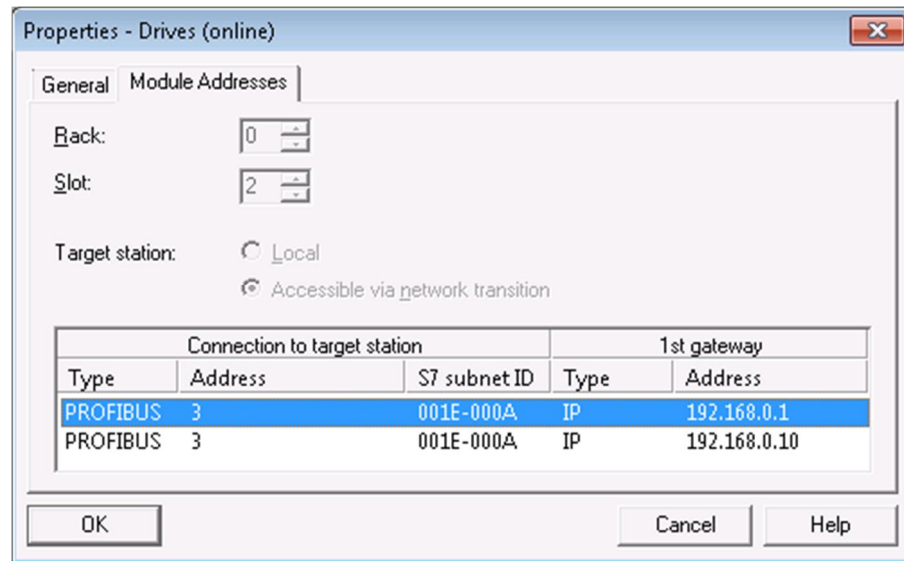
Fig. 2-5: PG/PC station with activated S7ONLINE access in NetPro



If a routed online connection to a target device (e.g. SINAMICS_Integrated) cannot be established, please check the S7 routing information.

1. Right-click the relevant target device (e.g. SINAMICS_Integrated) > "Target device > Online access ..."
2. Go to the "Module Addresses" tab to check the routing information.

Fig. 2-6: Checking the S7 routing information



In Fig. 2-6, the S7 routing is carried out via a SIMOTION control with the IP address 192.168.0.1. The PG/PC must be connected here.

The SIMOTION control routes the online connection from the PG/PC to the PROFIBUS_Integrated network with the S7 subnet ID 001E-000A.

Please note that this S7 routing information must be stored and translated. The S7 routing information is made known to the relevant control when the HW configuration is downloaded. Only then can a routed online connection be established.

..... flexible online access without NetPro configuration

If you want to establish an online connection to a target device via the S7ONLINE access point, i.e. if you want to change the interface of the target device, you do not need to reconfigure NetPro each time.


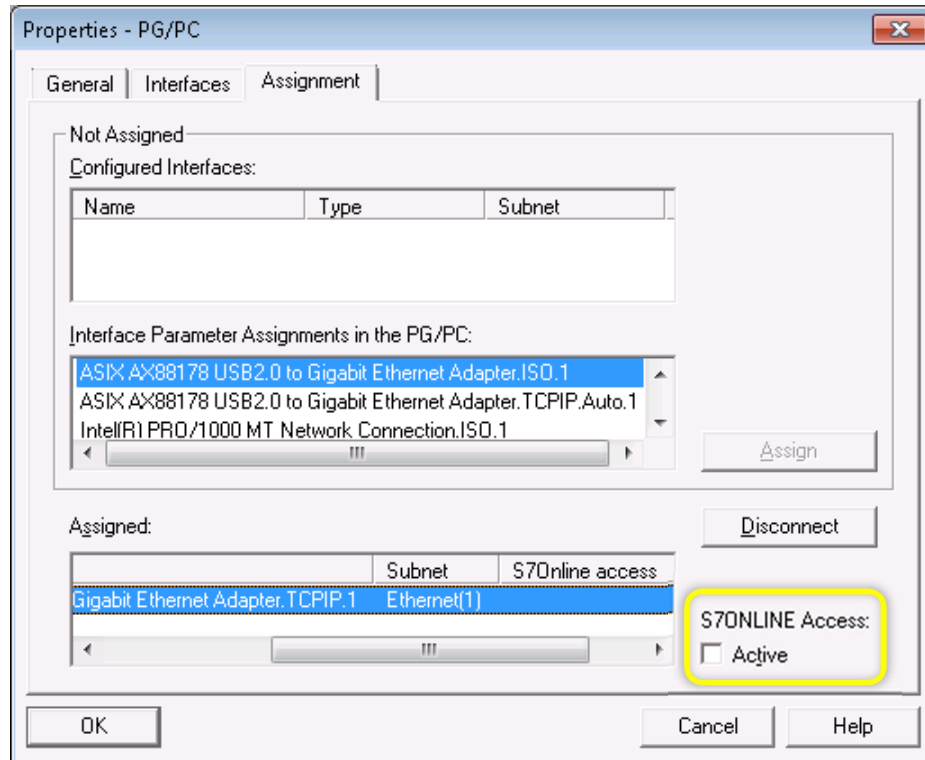
You can open the PG/PC properties from NetPro by choosing the "Assign  PG/PC..." button in SIMOTION SCOUT. Here, you can deactivate the active S7ONLINE access.

Fig. 2-7: PG/PC station with deactivated S7ONLINE access in NetPro



You may also omit the PG/PC station completely from the NetPro configuration if required.

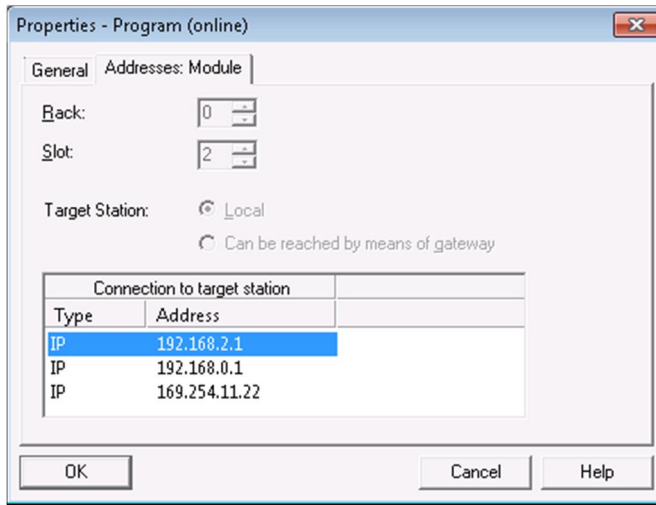
Note

However, it is important to note that no nodes in other networks (e.g. SINAMICS_Integrated) can be accessed as a result.

Now you must specify the interface (access address) via which an online connection is to be established.

1. For this purpose, select the target device in the navigation area of SIMOTION SCOUT (or STARTER) and right-click it to open the shortcut menu.
1. Under "Target system > Online access > Addresses: Modules", you must select an access address via which you want to go online (see Fig. 2-8).

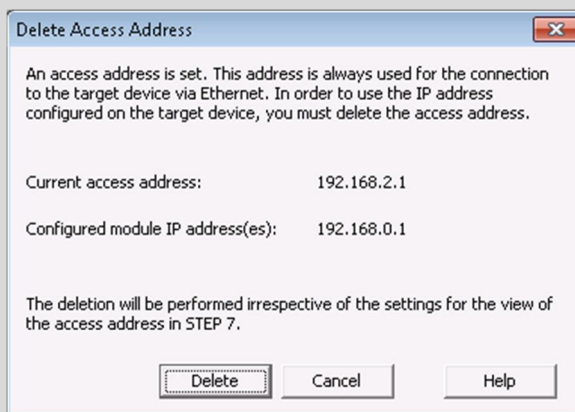
Fig. 2-8: Selecting the interface on the target device



NOTICE As of STEP7 V5.5 SP3, the IP address (access address) selected here takes precedence over the configuration in HW Config or NetPro. If the S7ONLINE access is subsequently reactivated in NetPro, the IP address selected here remains the access address and an online connection may potentially not be established.

Note As of SIMOTION SCOUT V4.3 SP1 HF12, the following message is also displayed in the output window of the target system for improved transparency in the event of a fault (if an access address is configured):
 “No connection could be established. Access address used: <IP address>.”

Note As of SIMOTION SCOUT V4.3 SP1 HF12, the new “Delete Access Address” function enables you to delete the access address. You can access this via the shortcut menu > “Target device > Delete access address”.



Once you have deleted the access address, store and translate the project to transfer the change. The online connection is then re-established in accordance with the configuration in HW Config or NetPro.

2.4.2 ... DEVICE

As of SIMOTION SCOUT (or STARTER) V4.2, the DEVICE access point is available as an alternative to the S7ONLINE access point. The DEVICE access point offers the following benefits:

- **Going online with separate projects simultaneously**

An online connection cannot be established from a PG/PC with several target devices simultaneously via the S7ONLINE access point if these devices are in separate projects.

If an attempt is made to establish several online connections via the S7ONLINE access point, the engineering system registers the fact that the PG/PC interface to be used is already communicating and so another online connection cannot be established.

However, if you use the alternative DEVICE access point, you can establish an online connection to several target devices in different projects simultaneously.

- **Going online quickly and easily**

The DEVICE access point enables you to establish an online connection with a target device quickly and easily without having to adjust the configuration in NetPro.

For example, if you want to connect the PG/PC to another interface on the target device (from X150 to X127), you do not have to change the configuration in NetPro in order to do so; you simply need to specify, for example, the relevant IP address of the target device in the settings for the DEVICE access point.

Please also note the following information.

- **Going online independently of the HW configuration and NetPro**

If you want, for example, to establish an online connection via remote access to modules that are located behind a router (e.g. SCALANCE S) that uses the NAT router (Network Address Translation) function, you cannot generally go online via the IP address that is configured in HW Config (NetPro).

The NAT router involves configuring an IP address conversion. In other words, an "external" IP address is assigned to each "internal" IP address, whereby the associated modules can only be accessed from outside via the "external" IP address. For this reason, the S7ONLINE access point cannot be used. The DEVICE access point must always be used. Here, you can define any IP address to which you want to establish an online connection, that is, the "external" IP address of the relevant module.

The DEVICE access point is also used to establish an online connection to machine modules, which are often found in a machine network, but for which there is only one SIMOTION or SINAMICS project.

In this case, only one or no IP address is configured in HW Config ("Use different method to obtain IP address"), which means that an IP address must be defined via the DEVICE access point to go online.

This also applies, for example, when establishing multiple connections of a SIMOTION

I-Device to a superimposed IO controller if the SIMOTION I-Device project exists only once but is loaded to several machine modules. It is important to

note that only one online connection to a machine module can be established at any one time.

Note

It is possible to configure both access points for a target device and to go online via these points alternately. This enables you to go online via SIMOTION SCOUT (or STARTER) from different locations and via different interfaces, for example:

- From the control room via the PN network on the X150 (S7ONLINE), or
- Locally directly on the controller in the machine shop via X127 (DEVICE).

In these cases, please ensure that the correct PG/PC interface has been selected for both access points.

A disadvantage of the DEVICE access point is that it must be adjusted individually for each device – hence the name DEVICE. The name DEVICE does **not** mean that the PG/PC **must** be connected directly to the target system. With the DEVICE access point, the PG/PC can also establish an online connection via a network.

Note

If you want, for example, to establish a connection to SINAMICS G via USB, you must always use the DEVICE access point.

..... manually adjusting the DEVICE access point

The DEVICE access point must be adjusted individually for each device in the project.

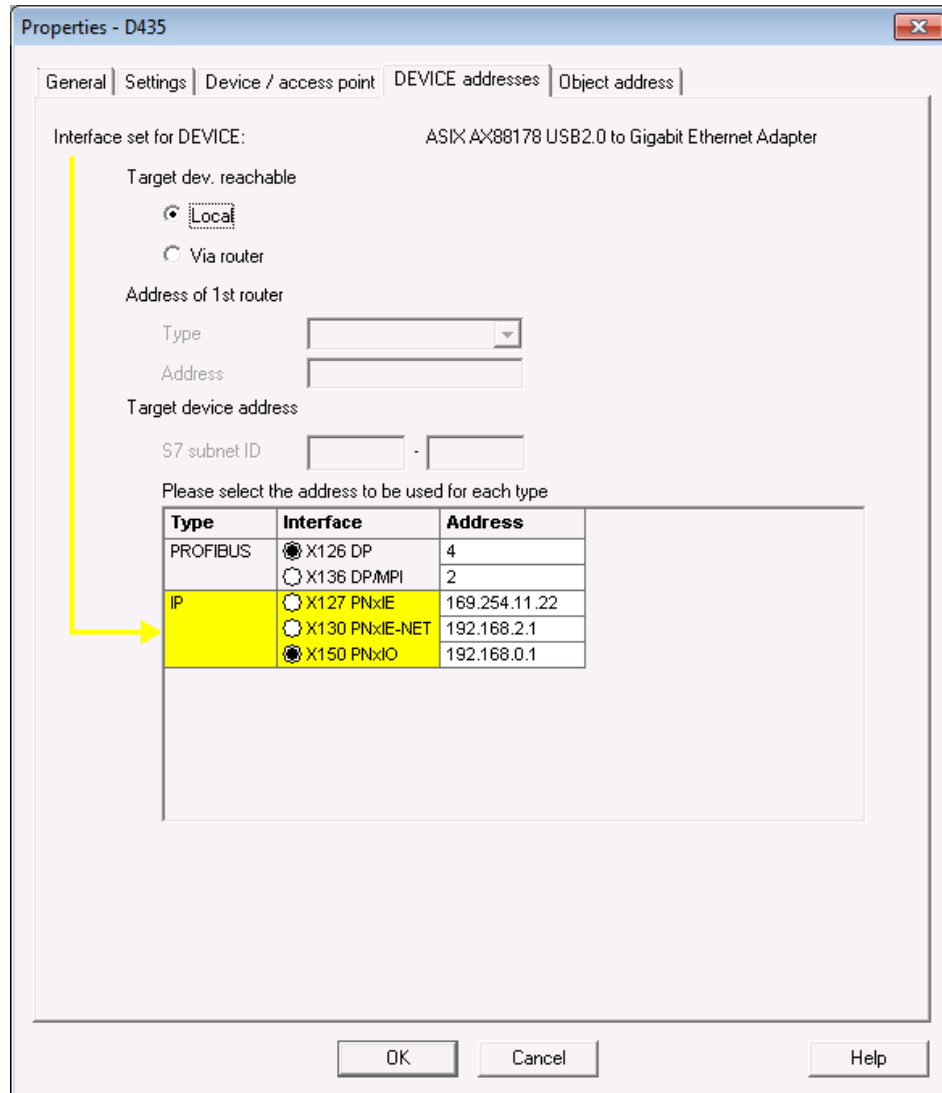
2. For this purpose, select the relevant module and right-click it to open the shortcut menu. Then select the “Properties” menu item.
3. On the “Device / access point” tab, you need to select the DEVICE access point.

Fig. 2-9: Selecting the DEVICE access point



You can open the settings for the DEVICE access point either via “Set DEVICE addresses” or via the “DEVICE addresses” tab (see Fig. 2-10).

Fig. 2-10: Setting the DEVICE access point for a SIMOTION control



Select whether the target device can be accessed locally (i.e. on the same network as the PG/PC) or via one gateway (via a router).

DEVICE access point without gateway

If you select “Local”, you must then select the corresponding interface on the target device (e.g. X150) via which an online connection is to be established (see Fig. 2-10). It is essential that you specify the correct IP address of the target device.

Note

If the IP address of the target device is changed subsequently in the HW configuration and then loaded to the target device, the setting of the DEVICE access point must also be adjusted subsequently to establish an online connection again.

It may also be useful to load the project without HW configuration.

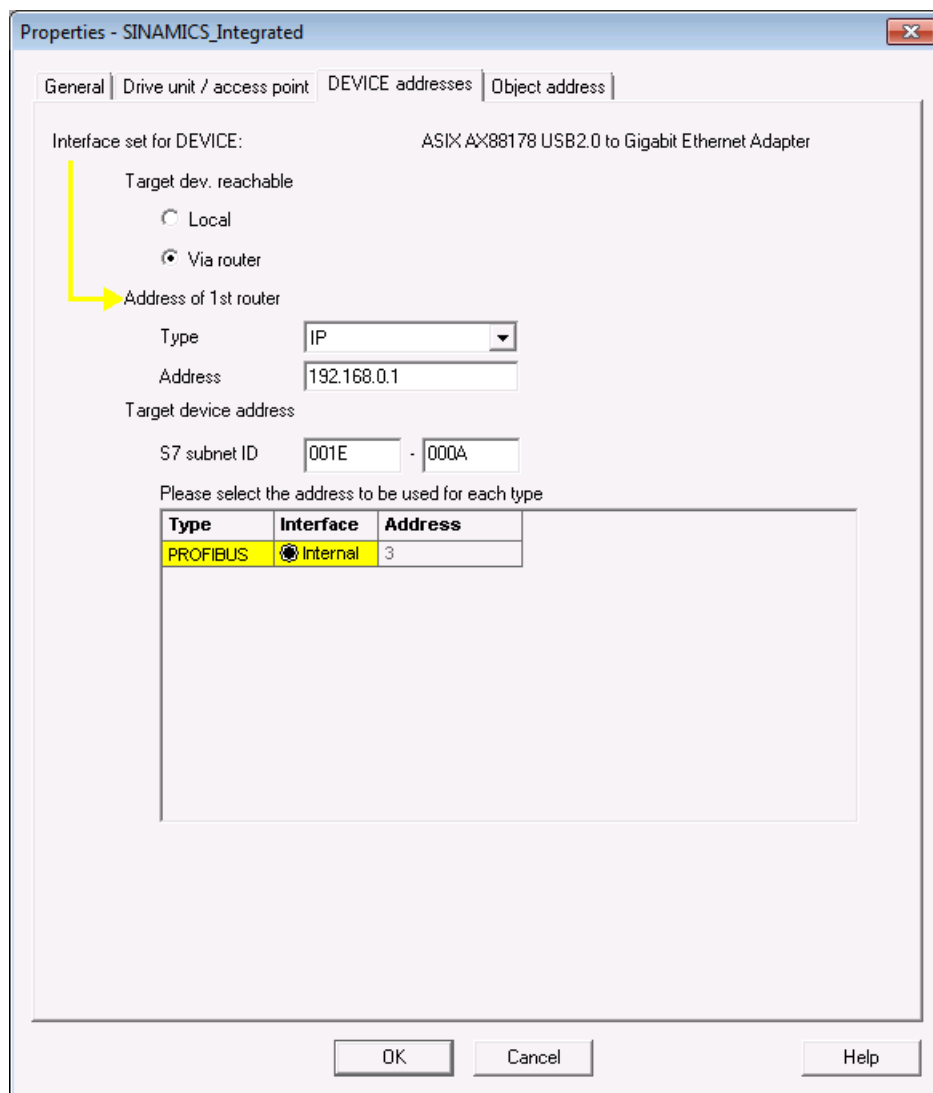
DEVICE access point with gateway

Like the S7ONLINE access point, the DEVICE access point enables you to establish an online connection to a target device via a routed connection. It is important to note that only one gateway can be set.

A SINAMICS_Integrated drive has no direct connection to an interface of the SIMOTION control. In other words, to establish an online connection to a SINAMICS_Integrated, the SIMOTION control must route the online connection from the PG/PC through to the SINAMICS_Integrated (S7 routing).

The following figure shows the settings for the DEVICE access point for establishing an online connection to a SINAMICS_Integrated via Ethernet (or TCP/IP).

Fig. 2-11: Setting the DEVICE access point for a SINAMICS_Integrated drive



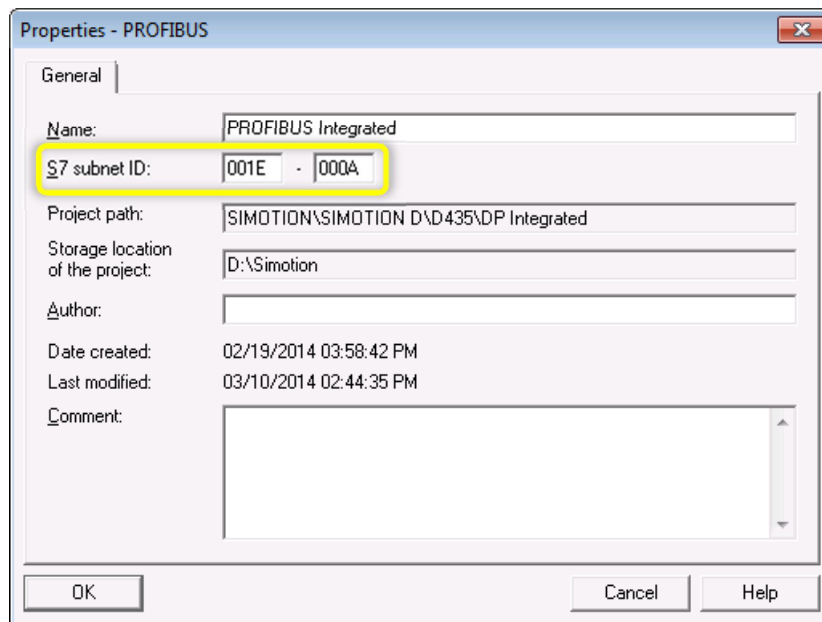
In this example, the PG/PC is connected to an Ethernet interface of the SIMOTION control with the IP address 192.168.0.1 (e.g. PROFINET network, X150). Please ensure that you select the type "IP". There is also the type "Ethernet", which requires the corresponding MAC address.

The SIMOTION control must now route the online connection from the PG/PC via the Ethernet interface with the IP address 192.168.0.1 through the PROFIBUS_Integrated to the SINAMICS_Integrated (DP address = 3) (S7 routing).

To establish a routed online connection via the DEVICE access point, you must enter an "S7 subnet ID" in the address settings.

For the SINAMICS_Integrated, you obtain the "S7 subnet ID" in HW Config by double-clicking PROFIBUS_Integrated > "Properties..." (see Fig. 2-12).

Fig. 2-12: S7 subnet ID



..... automatic setting for all accessible nodes

The settings for the DEVICE access point can also be determined automatically by assigning the configured modules to an accessible node. The access data, such as the IP address and the S7 routing information, is transferred automatically by the accessible nodes.

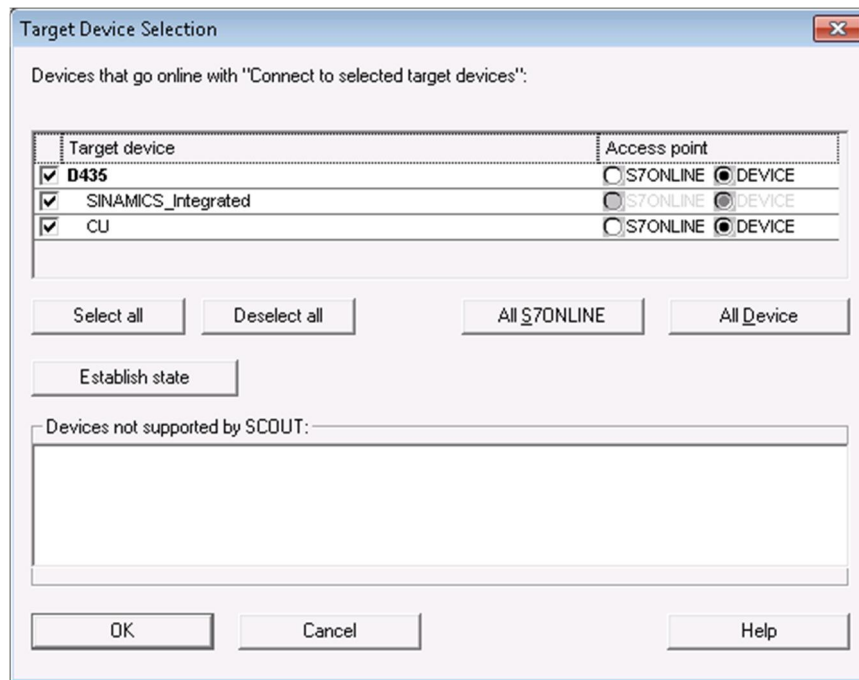
This approach is useful if you want to establish an online connection to several target devices via the DEVICE access point.

Note

To use this function, a correct PG/PC interface must already have been set for the DEVICE access point (e.g. "<USB Ethernet Adapter>.TCPIP", see Section 2.1).

1. Ensure that the DEVICE access point is selected for the desired modules via the menu command "Target system > Select target devices..."

Fig. 2-13: Setting the access point for all modules in the project




2. Close the "Target Device Selection" window by choosing OK and then call up the "Accessible nodes" function in SIMOTION SCOUT (or STARTER). 
3. Here, set the access point to "DEVICE (STARTER, SCOUT)" using the "Access point" button (see Fig. 2-14).
4. Update the accessible nodes again. (see Fig. 2-15).

Fig. 2-14: DEVICE access point for establishing an online connection to the accessible nodes

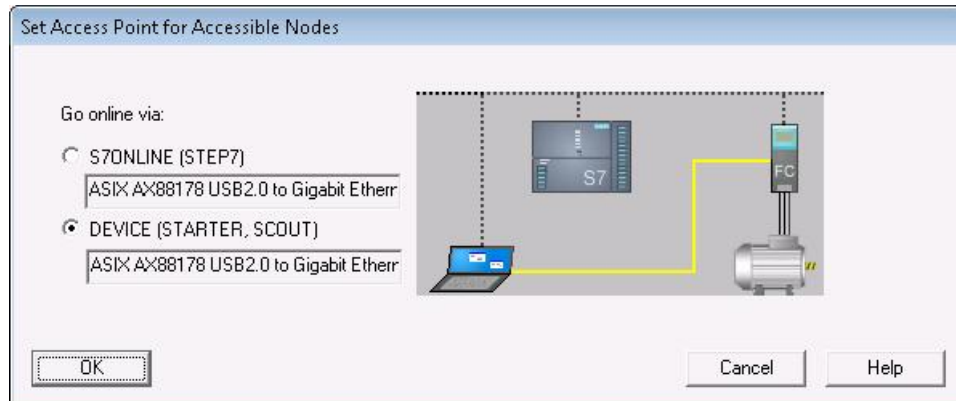
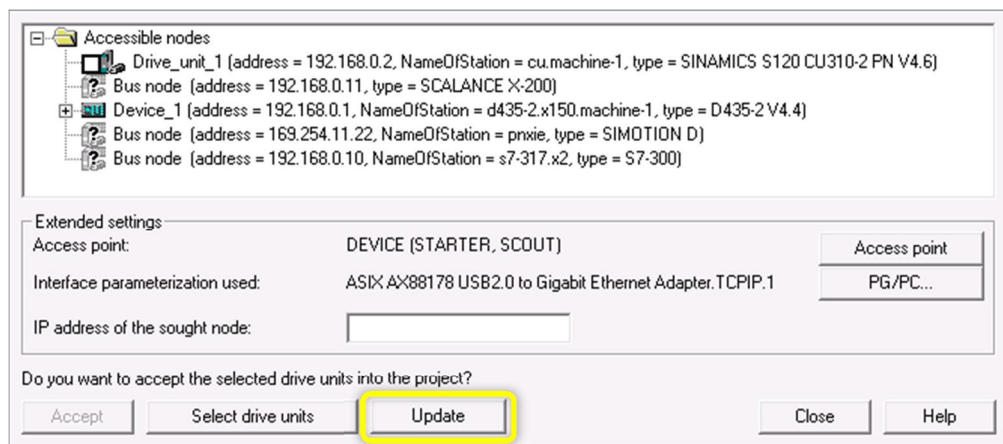


Fig. 2-15: Updating the accessible nodes

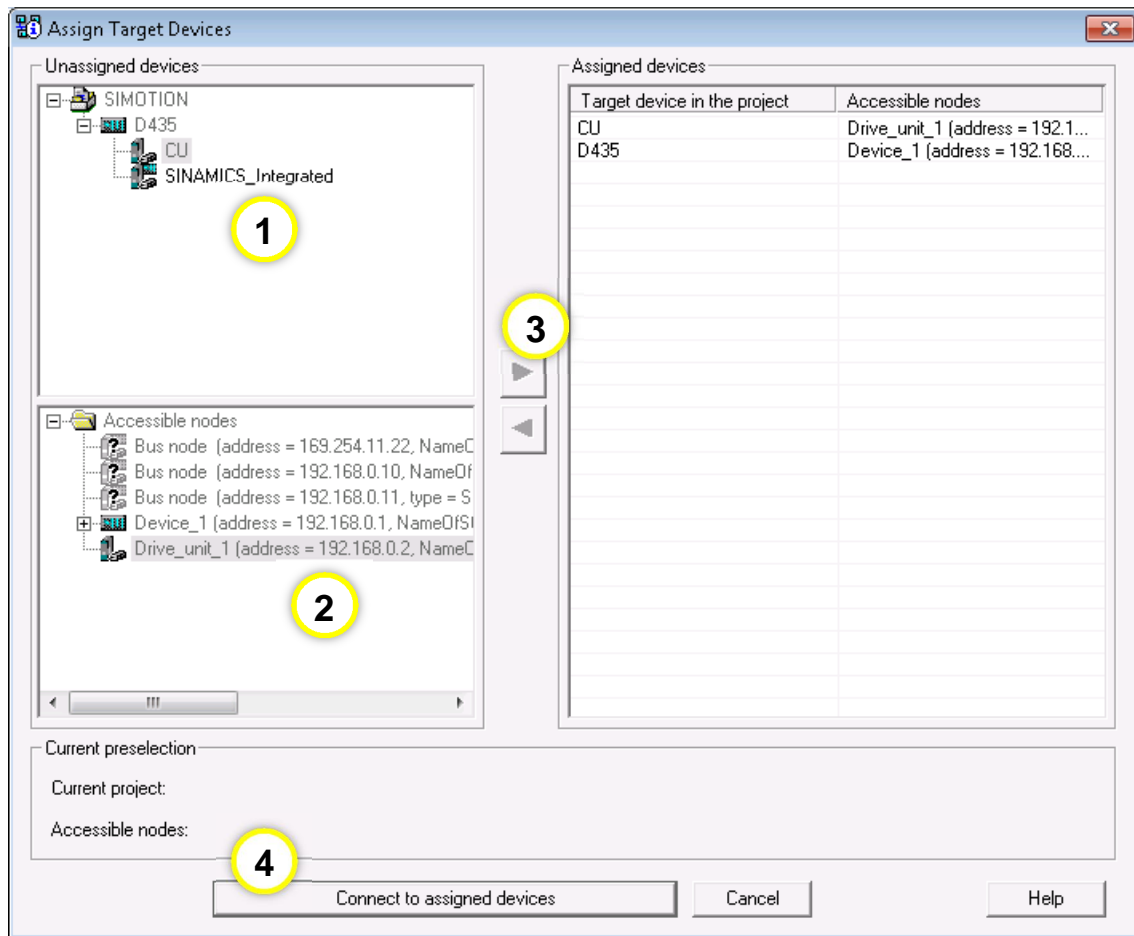


5. Once you have updated the accessible nodes, choose the “Connect to selected target devices” button.



6. The following window then appears, in which you must assign the accessible nodes to the configured modules, whereby the DEVICE access point is set automatically (see Fig. 2-16).

Fig. 2-16: Assignment of the configured modules to an accessible node



For this purpose, select a configured module in the top left-hand window and the corresponding accessible node in the network in the bottom left-hand window and assign them to each other by using the arrow button.



You can now establish an online connection to the target devices via the “Connect to assigned devices” button.

Note If the configured modules in the top left-hand window are shown in gray, this is due to one of the following:

- The DEVICE access point was not set in the “Connect to selected target devices” menu item.
- The device has already been assigned.

Note The relevant module can only be assigned if its type and firmware information is also shown when searching the network via “Accessible nodes”. If this is not the case, the PG/PC is not in the same subnet as the respective accessible node.

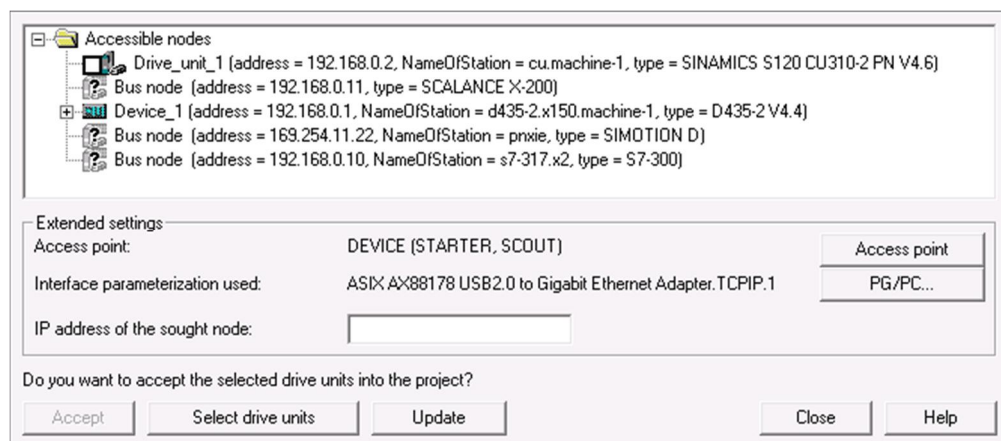
2.5 “Accessible nodes” function

If you cannot now go online, you can use the “Accessible nodes” function to search the network on which the PG/PC is located. In this case, please note that you can see the relevant module via “Accessible nodes” but you may not be able to establish an online connection to it.

This is because the “Accessible nodes” function is based on the DCP (Discovery and Configuration Protocol) telegram. In accordance with the OSI model, the DCP telegram is a “layer 2” telegram based on MAC addresses. The PG/PC does not have to be in the same subnet as the accessible node (IP address + subnet mask) for this purpose.

Going online, on the other hand, works using the S7 protocol, which is based on TCP/IP (“layer 4”) with Ethernet. For this, the PG/PC must be in the same subnet as the corresponding target device (IP address + subnet mask).

Fig. 2-17: “Accessible nodes” function



The following information is displayed for the accessible nodes in the network:

- IP addresses
- PROFINET device names and
- Device families (e.g. SIMOTION D)

actuating signal.

The “Accessible nodes” function can therefore be used to check the IP address of a module with which an online connection is to be established.

The exact device type (e.g. SIMOTION “D435-2”) and the firmware version of a module can only be determined if the PG/PC is in the same subnet as the respective module. In Fig. 2-17, the PG/PC is not in subnet 169.254.xxx.xxx, for example, and the SIMOTION D module with the IP address 169.254.11.22 cannot therefore be diagnosed.

If you want to establish an online connection to a node that cannot be diagnosed but is accessible, one of the following must be carried out:

- The online, active IP address of the node found must be adapted as necessary (right-click the node > “Edit Ethernet Node...”).
- A corresponding IP address must be added to the Windows adapter settings, either:
 - manually as described in Section 2.2 or
 - automatically as described below.

Note

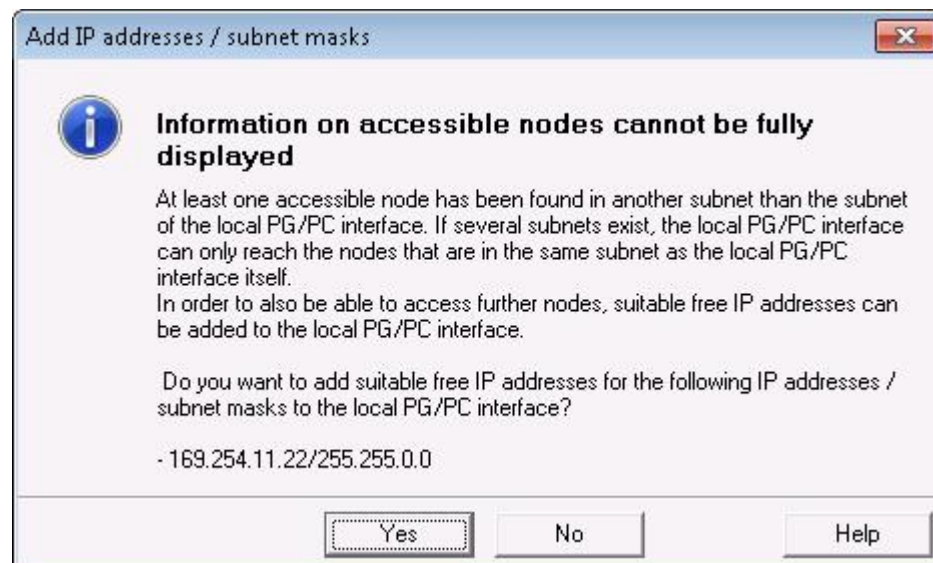
Several IP addresses can be defined for an Ethernet interface in the Windows adapter settings.

If TCP/IP (Auto) was not selected in the PG/PC interface selection but “only” **TCP/IP**, the following window (see Fig. 2-18) appears as of SIMOTION SCOUT (or STARTER) V4.2 if the network contains nodes in a subnet that is different from the PG/PC.

The nodes from other subnets cannot be diagnosed and an online connection to these modules cannot be established.

You can use this dialog to confirm that STEP7 is to create a “virtual” IP address in Windows. This creates the basic requirement for establishing an online connection to the nodes found.

Fig. 2-18: Confirmation of whether STEP7 should create a “virtual” IP address



However, if **TCP/IP (Auto)** was selected, the missing IP addresses are automatically added “virtually” in Windows without this dialog as confirmation.

NOTICE The “virtual” IP address that was created is not shown.

The “virtual” IP addresses created by STEP7 remain active until the next Windows restart and are not immediately apparent in the Windows adapter settings.

You can check the “virtual” IP addresses created by STEP7 by entering “ipconfig /all” in the command line window.

A “virtual” IP address that has been created bears the risk that it may already exist in the network, which would result in considerable network problems. It is not immediately apparent to the user that there may be a conflict of IP addresses.

Note If a node that has been found is displayed with the device type and firmware version, an online connection to this target device can be established if:

- The access point (S7ONLINE or DEVICE) has been set correctly and
- the device type and firmware version match the corresponding configured module.

If only the configured and online active IP addresses of a module are different, the DEVICE access point can also be used to establish an online connection. This has the advantage that an IP address to which an online connection is to be established can be defined independently of the HW configuration or NetPro.

Possible error cause when searching the network

If no modules are found when the network is searched using “Accessible nodes”, the following information appears.

Fig. 2-19: No accessible nodes found



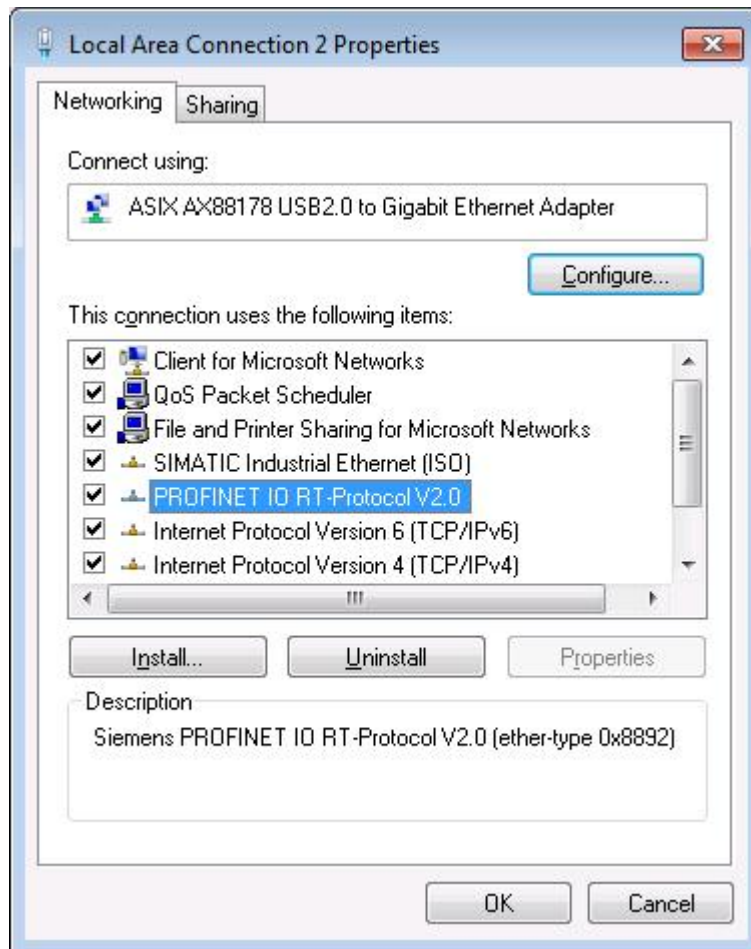
The same information could also appear with the DEVICE access point.

If this is the case, please check the adapter settings in Windows for the PG/PC interface to establish whether **PROFINET IO RT-Protocol V2.0** has been installed and selected. The checkbox must be selected (see Fig. 2-20).

Open the Windows adapter settings via the Windows Start menu > “Control Panel > Network and Sharing Center > Change Adapter Settings”.

Right-click the relevant Ethernet interface to open its properties.

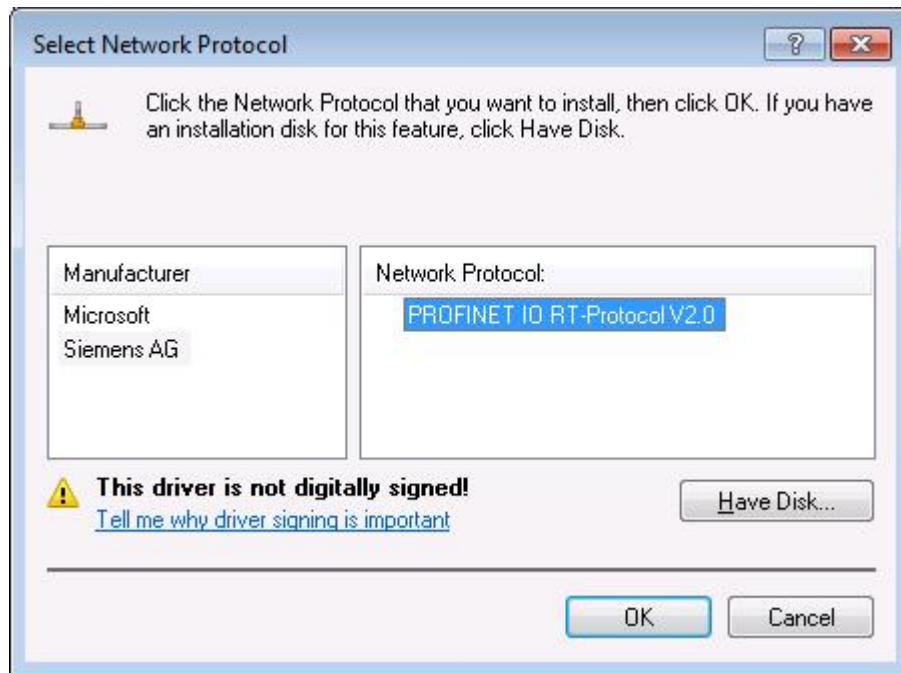
Fig. 2-20: Windows adapter settings



If this protocol is not listed, it needs to be installed subsequently.

1. For this purpose, choose the "Install" button.
2. In the dialog that then appears, select "Protocol".
3. Then select "Siemens AG" and "PROFINET IO RT-Protocol V2.0" and confirm the installation by choosing "OK" (see Fig. 2-21).

Fig. 2-21: Installing "PROFINET IO RT-Protocol V2.0"



Note

If no nodes are found when the network is searched via "Accessible nodes" even though "PROFINET IO RT-Protocol V2.0" has been installed and activated, it may help to **deactivate and then reactivate** the PG/PC interface used in Windows.

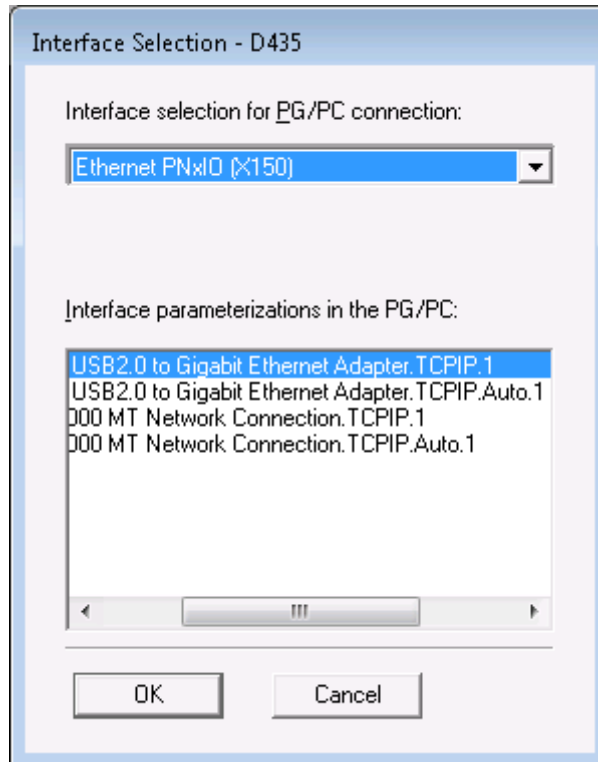
When a "Virtual Machine (VM)" is being used, a restart should be carried out if problems persist.

3 Tips and tricks

3.1 ... for creating a new SIMOTION project

When you add a new SIMOTION control into a project, the following window appears if the project does not yet contain a PG/PC station.

Fig. 3-1: Automatically creating and connecting a PG/PC station in NetPro



In the dialog shown above, select the interface for the SIMOTION control (e.g. X150) via which you want to establish an online connection and select the desired PG/PC interface. Confirm your selection with “OK”.

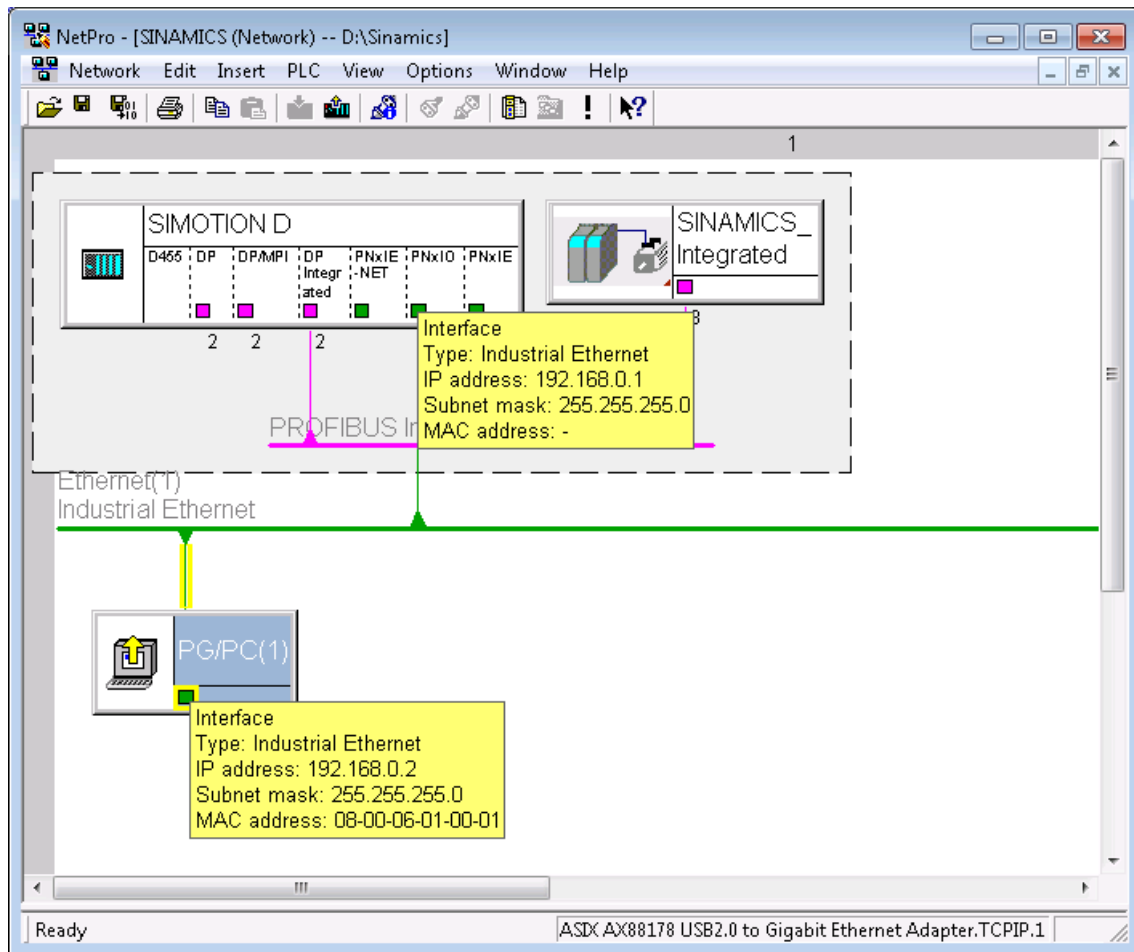
A PG/PC station with a corresponding interface is then added automatically to NetPro (e.g. an Ethernet interface connected to the onboard PN interface X150 of the SIMOTION module).

However, the IP address for the PG/PC station is assigned automatically and simply incremented independently of the IP address of the SIMOTION control (see Fig. 3-2).

If you were to then add further devices (e.g. SINAMICS drive with PN interface), they would then be assigned the next available IP address in the project by default (e.g. 192.168.0.3). If the IP address is previously changed by the PG/PC to 192.168.0.99, the next new device to be added would then be assigned the IP address 192.168.0.100.

The IP address of the PG/PC station in NetPro is not essential for going online and it serves only as a placeholder for the assignment of further IP addresses in HW Config. Naturally, however, this should match the actual IP address in Windows.

Fig. 3-2: NetPro with automatically created PG/PC station

**Note**

The IP addresses 192.168.215.240 to 192.168.215.255 are reserved for internal communication in the SIMOTION D4x5-2 (subnet mask 255.255.255.240).

When configuring the Ethernet interfaces (X127, X120, and X130), it must be ensured that they are present in other subnets.

Tip: Selecting “No interconnection”

Select no interface on the SIMOTION control in Fig. 3-1 (“No interconnection”). As a result, a PG/PC station is also created in NetPro, although without an interface. You can also add these manually at a later point in time, as described in Section 2.4.1.

This has the advantage that all further new IO devices that are created (e.g. SINAMICS drives, ET 200 stations, etc.) are successively assigned an IP address independently of the IP address of the SIMOTION control.

Configure all IO devices in HW Config first, and only then should you configure the PG/PC station with the corresponding IP address and assigned PG/PC interface, as described in Section 2.4.1.

3.2 ... for the first download to a SIMOTION control

Tip: Loading to the file system via SIMOTION SCOUT

When commissioning for the first time, it is recommended to load a SIMOTION project (incl. HW configuration) via card reader to the corresponding SIMOTION memory card (right-click on the relevant SIMOTION control > "Load to file system... > Save normally" > enter drive letter of the SIMOTION memory card).

The advantage of this is that the SIMOTION control then has the correct IP address for going online.

Tip: Loading from HW Config

Alternatively, the first download is to be carried out from HW Config. The accessible nodes are shown here via the "Display" button. The relevant target device can simply be selected. If it does not yet have an IP address (e.g. 0.0.0.0 in the delivery state), a dialog appears via which the target device can be assigned a temporary IP address for download purposes.

Fig. 3-3: Downloading from HW Config

Over which station address is the programming device connected to the module D435?

Rack: 0
Slot: 2

Target Station: Local
 Can be reached by means of gateway

Enter connection to target station:

IP address	MAC address	Module type	Station name	Module name
192.168.0.1	00-1F-F8-09-18-CC	CPU435-2		

Accessible Nodes

IP address	MAC address	Module type	Station name	Module name
192.168.0.1	00-1F-F8-09-18-CC	CPU435-2		
169.254.11.22	00-1F-F8-09-18-CB	SIMOTION D	pnxie	
192.168.0.10	00-0E-8C-B2-B3-ED	S7-300	s7-317.x2	

Update

OK Cancel Help

Note

If the active IP address of the target device is known and the PG/PC is in the same subnet, the active IP address of the target device can also simply be entered in the window shown above (highlighted in blue) without having to search the network beforehand.

3.3 ... for an online connection through a firewall

For establishing an online connection via TCP/IP (or UDP), predefined ports are used. It must be ensured that the relevant ports are activated (open) along the entire line of communication from the PG/PC to the target device in all routers and/or firewalls that are involved.

The ports and services that you need to activate to establish a (routed) online connection to a SIMOTION control or SINAMICS drive are outlined below.

Ports for a direct online connection via Ethernet

- **SIMOTION C, D, P**
 - ICMP request (ping)
 - TCP port 102 (S7 communication)
 - TCP port 5188
- **SINAMICS S, G (except G120 FW V4.3.2 .. V4.6)**
 - ICMP request (ping)
 - TCP port 102 (S7 communication)
- **SINAMICS G120 FW V4.3.2 .. V4.6**
 - ICMP request (ping)
 - UDP port 34964 (PROFINET-CM protocol)
 - UDP ports 49152 to 65535 (free, dynamic ports)

Ports for a routed online connection (e.g. from Ethernet to PROFIBUS)

- **SINAMICS S, G (incl. G120 FW V4.3.2 .. V4.6)**
 - ICMP request (ping)
 - TCP port 102 (S7 communication)

Note

The following must be observed for an **online connection via Ethernet**:

The UDP port via which the online connection to a SINAMICS G120 drive FW V4.3.2 .. V4.6 is ultimately established is negotiated dynamically beforehand using the PROFINET CM protocol between the PG/PC and the drive is within the range of free, dynamic ports (49152-65535).

Therefore, it is essential that either this range is activated along the entire line of communication or the routers involved are able to identify the negotiated port and activate it dynamically at runtime.

Note

The following link provides a list of further ports that are used for special services with SIMOTION controls:

<http://support.automation.siemens.com/WW/view/en/35680316>

For additional information on this topic, refer to:

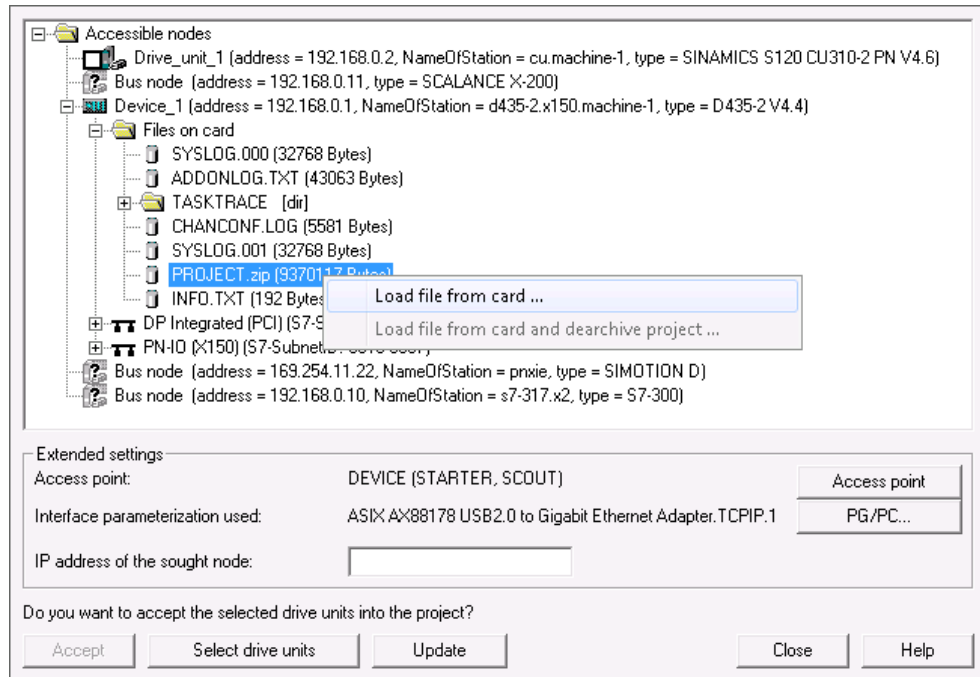
<http://support.automation.siemens.com/WW/view/en/8970169>

3.4 ... for going online without an existing project

Tip: Loading project archive via “Accessible nodes”

If a SIMOTION project was stored as a ZIP archive on the SIMOTION memory card, you can upload it from there using the “Accessible nodes” function.

Fig. 3-4: Loading project archive via “Accessible nodes”



To do so, open the SIMOTION control device tree. If a project was stored on the memory card, it is located in the “Files on card” folder (“PROJECT.zip”).

By right-clicking “PROJECT.zip” > “Load file from card...”, you can upload the project from the memory card and de-archive it.

Note

If a project archive was not stored on the SIMOTION memory card, you may be able to load the project data to the PG/PC.

4. To do so, create a new SIMOTION SCOUT project.
5. Add a new SIMOTION control to the project in accordance with the existing device type and firmware version.
6. Next, establish an online connection to the module as described in Section 2.
7. Then load the project data from the SIMOTION control to the PG/PC using the “Load to PG” function.

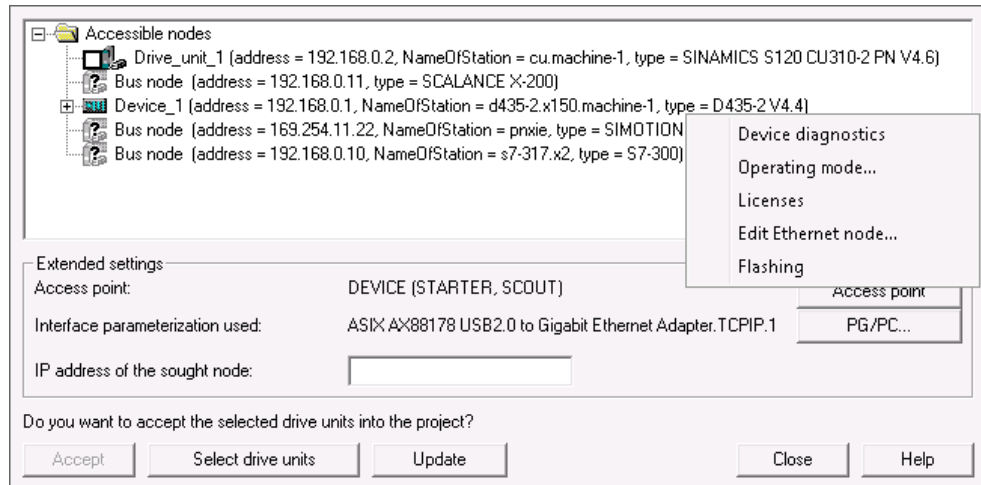
Additional data (e.g. ST source file) of a project can only be loaded to the PG/PC if the project was previously loaded explicitly to the target device using the “Store additional data on the target device” option.

3.5 ... for reading SIMOTION diagnostic data

Tip: Reading diagnostic data via “Accessible nodes”

By right-clicking the relevant SIMOTION control in the “Accessible nodes” window, you can view information such as the device diagnostics.

Fig. 3-5: Reading diagnostic data via “Accessible nodes”



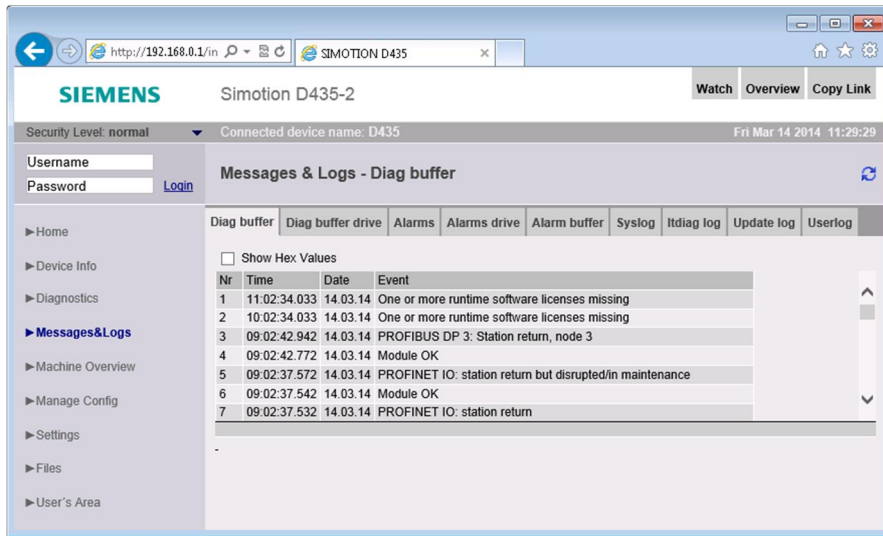
Tip: Reading diagnostic data via the SIMOTION web server

As of SIMOTION V4.1, you can also access the control via the web server and read the diagnostic information in this way.


Note

Please note that, as of SIMOTION V4.4, the previous standard login (simotion:simotion) is no longer supported. As soon as a project has been transferred to the control, user administration rights are required to access the extended diagnostic pages.

Fig. 3-6: Reading diagnostic data via the SIMOTION web server



3.6 ... for comparing online and offline projects

If inconsistencies in the project navigator between an offline and an online project  are shown after the online connection has been established, you can determine them via a project or object comparison (as of SIMOTION SCOUT V4.2) and debug them by means of an upload or download.

An object-granular comparison using the project comparison and an upload of the complete device is possible if the “Store supplementary data on the target device” option was previously selected for the download.

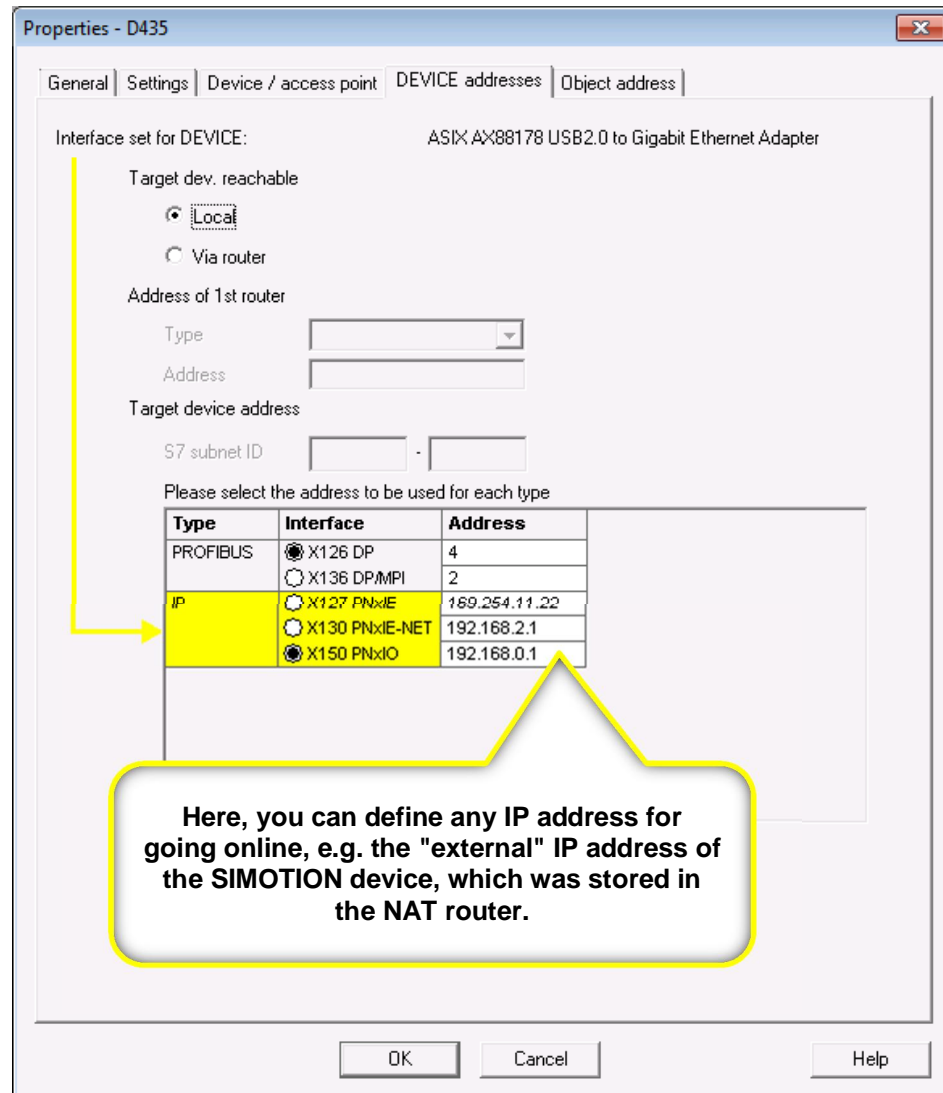
Fig. 3-7: Object comparison

	A	Status	B
SIMOTION_1			
Execution system		⊖	
I/O		⊖	
Global device variables		⊖	
HW Konfig (Zeitstempelvergleich)		?	
HW Konfig (I/O and system interface)		⊖	
Device settings		⊖	
System variables		⊖	
TO interconnections		⊖	
HMI relevant data		⊖	
AXES			
CAMS			
PROGRAMS			
ST_0	●		●
Source code		⊘	
Compilation result		⊘	
HMI relevant data		⊘	
ST_1	●		●

3.7 ... for online access via NAT

If you want, for example, to establish an online connection via remote access to modules that are located behind a router (e.g. SCALANCE S) that uses the NAT (Network Address Translation) router function, the online connection to the device can be established by selecting the alternative access point DEVICE.

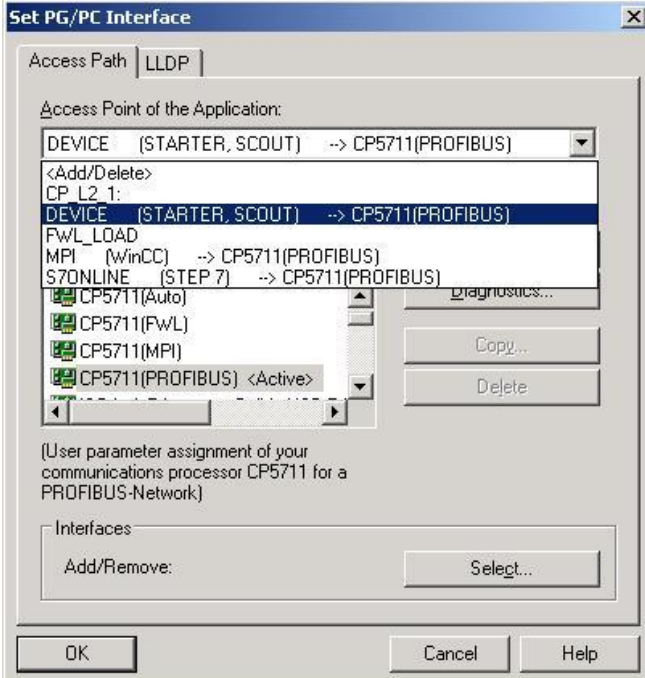
Fig. 3-8: Setting the DEVICE access point for a SIMOTION control

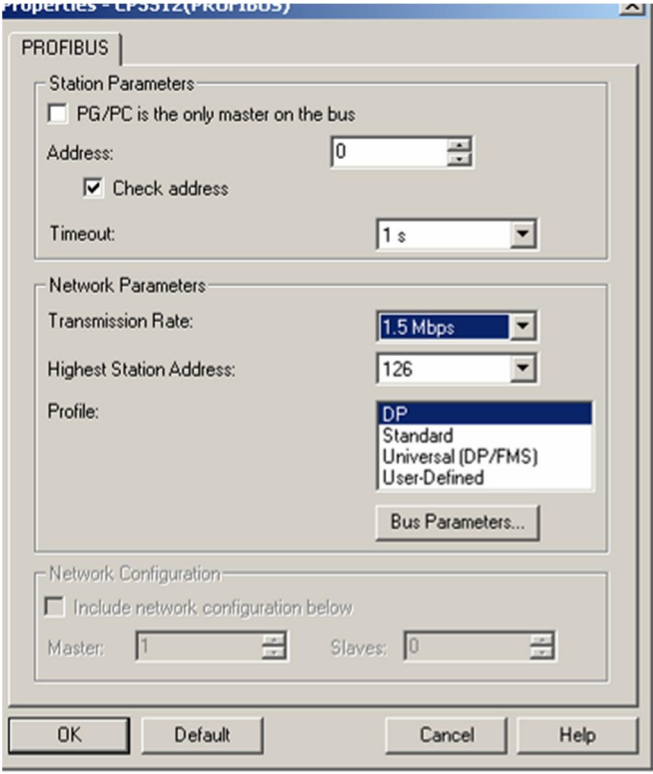
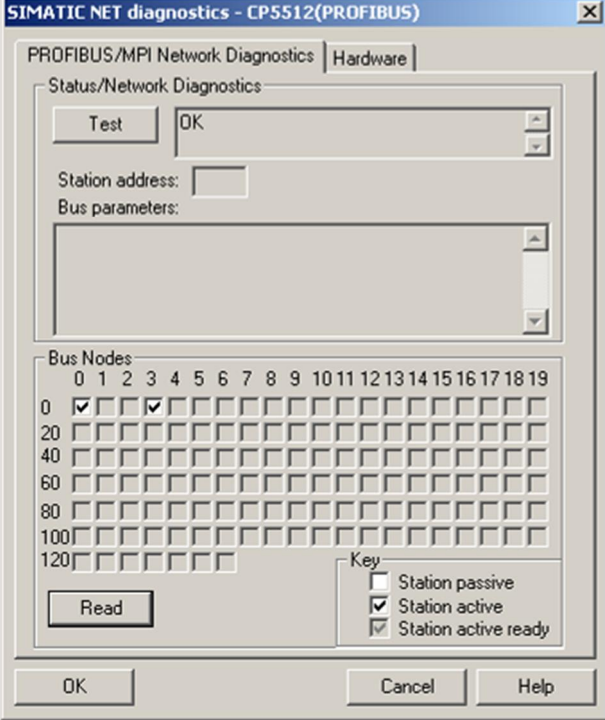


The procedure is described in detail in Chapter 2.4.2 (see the sections "Going online independently of the HW configuration and NetPro" and "Manually adjusting the DEVICE access point").

4 Establishing an online connection via PROFIBUS

Table 4-1: PROFIBUS settings

No.	Action
1.	<p>Open the PG/PC interface settings in SIMOTION SCOUT via the menu "Options -> Set PG/PC Interface".</p> <p>Here, select the access point via which you want to establish an online connection:</p> <ul style="list-style-type: none"> • S7ONLINE (standard route) or • DEVICE (alternative access point) <p>Here, define the desired PG/PC interface "CP5xxx" (PROFIBUS) for the desired access point.</p>  <p>Option (Auto)</p> <p>If you select an interface with automatic identification of the bus parameters (e.g. CP5611(Auto)), you can connect the PG to PROFIBUS (or MPI) without having to set the bus parameters. However, transfer rates of less than 187.5 Kbit/sec can result in waiting times of up to a minute. Prerequisite for automatic identification is that a master that distributes the cyclic bus parameters is connected to the bus. With PROFIBUS subnets, the cyclic distribution of bus parameters must not be switched off (predefined PROFIBUS network setting).</p> <p>If you select an interface without automatic identification of the bus parameters, open the properties and adjust them to the subnet (see next step).</p>

No.	Action
<p>2.</p>	<p>Then open the properties for the PROFIBUS PG/PC interface by choosing the “Settings” button. Here, set the PROFIBUS baud rate used in the network and confirm the settings by choosing the “OK” button.</p> 
<p>3.</p>	<p>Then test the PROFIBUS PG/PC interface by choosing the “Diagnostics” button. Check whether all configured, and also connected nodes, are displayed as bus nodes. If the test is terminated with an error message, check each of the following:</p> <ul style="list-style-type: none"> • Connectors • Terminating resistors • Baud rate setting  <p>You have now satisfied the PG/PC requirements to establish an online connection via PROFIBUS.</p>

No.	Action
4.	To configure the access point for PROFIBUS, please proceed as described in Section 2.4. <ul style="list-style-type: none"><li>• Naturally, a PROFIBUS interface “CP5xxx” is used as a PG/PC interface and<li>• a PROFIBUS address is always used as an access address.

When you establish an online connection via PROFIBUS, please ensure that you observe the following points:

- Terminating resistors
 - These may be switched on only at the ends of a PROFIBUS line. However, the PG/PC must then not be attached here for going online.
 - If the terminating resistors are placed in the middle of a PROFIBUS line, the following nodes will be separated from the bus.
 - Bus failures will result if the terminators are not switched on. Such failures can occur sporadically and are dependent on the line length and the baud rate setting.
- Only lines and plugs that are suitable for PROFIBUS may be used.
- Check the wiring (A and B lines can be interchanged in the plug).
- The PROFIBUS line shielding must be connected to all plugs throughout.
- All nodes in the network must support the required baud rate.
- A PROFIBUS address must not exist more than once in the network.
- If only passive nodes exist in the network, the “PG/PC is the only master on the bus” checkbox must be selected on the PG/PC.
- If there is an active node in the network, the “PG/PC is the only master on the bus” checkbox does not have to be selected on the PG/PC.

5 Addresses for the factory setting

Table 5-1: Factory settings

Device type	Interface	Factory setting
SIMOTION C240	X8 DP1 X9 DP2/MPI	PROFIBUS address 2, baud rate 1.5 Mbit/s PROFIBUS address 2, baud rate 1.5 Mbit/s
only SIMOTION C240 PN	X7 (Ethernet) X11 PN (PROFINET IO)	IP address: 169.254.11.22 Subnet mask: 255.255.0.0 IP address: 0.0.0.0 Subnet mask: 0.0.0.0
SIMOTION P350(-x)	X101 DP1 X102 DP2/MPI Ethernet 1 Ethernet 2	PROFIBUS address 2, baud rate 1.5 Mbit/s PROFIBUS address 2, baud rate 1.5 Mbit/s Windows: Obtain IP address automatically (DHCP) SIMOTION Runtime: IP address: 169.254.11.22 Subnet mask: 255.255.0.0 Windows: IP address: 192.168.214.241 Subnet mask: 255.255.255.0 SIMOTION Runtime: IP address: 192.168.214.1 Subnet mask: 255.255.255.0
SIMOTION P320(-x)	Ethernet 1	Windows: IP address: 169.254.11.21 Subnet mask: 255.255.0.0 SIMOTION Runtime: IP address: 169.254.11.22 Subnet mask: 255.255.0.0
SIMOTION D4x5	X126 DP1 X136 DP2/MPI X120 IE1/OP (Ethernet) X130 IE2/NET (Ethernet) X1400 CBE30 (PROFINET IO)	PROFIBUS address 2, baud rate 1.5 Mbit/s PROFIBUS address 2, baud rate 1.5 Mbit/s IP address: 192.168.214.1 Subnet mask: 255.255.255.0 IP address: 169.254.11.22 Subnet mask: 255.255.0.0 IP address: 0.0.0.0 Subnet mask: 0.0.0.0
SIMOTION D410 DP	X21 BUS	PROFIBUS address 2, baud rate 1.5 Mbit/s
SIMOTION D410 PN	X200 (and X201) (PROFINET IO)	IP address: 0.0.0.0 Subnet mask: 0.0.0.0
SIMOTION D410-2 DP	X21 DP/MPI X24 DP X127 PN/IE (Ethernet)	PROFIBUS address 2, baud rate 1.5 Mbit/s PROFIBUS address 2, baud rate 1.5 Mbit/s IP address: 169.254.11.22 Subnet mask: 255.255.0.0

Device type	Interface	Factory setting
SIMOTION D410-2 DP/PN	X21 DP/MPI	PROFIBUS address 2, baud rate 1.5 Mbit/s
	X127 PN/IE (Ethernet)	IP address: 169.254.11.22 Subnet mask: 255.255.0.0
	X150 PN (PROFINET IO)	IP address: 0.0.0.0 Subnet mask: 0.0.0.0
SIMOTION D4x5-2 DP	X126 DP X136 DP/MPI	PROFIBUS address 2, baud rate 1.5 Mbit/s PROFIBUS address 2, baud rate 1.5 Mbit/s
	X127 PN/IE (Ethernet)	IP address: 169.254.11.22 Subnet mask: 255.255.0.0
	X120 PN/IE-OP (Ethernet)	IP address: 0.0.0.0 Subnet mask: 0.0.0.0
	X130 PN/IE-NET (Ethernet)	IP address: 0.0.0.0 Subnet mask: 0.0.0.0
SIMOTION D4x5-2 DP/PN	X126 DP X136 DP/MPI	PROFIBUS address 2, baud rate 1.5 Mbit/s PROFIBUS address 2, baud rate 1.5 Mbit/s
	X127 PN/IE (Ethernet)	IP address: 169.254.11.22 Subnet mask: 255.255.0.0
	X130 PN/IE-NET (Ethernet)	IP address: 0.0.0.0 Subnet mask: 0.0.0.0
	X150 PN (PROFINET IO)	IP address: 0.0.0.0 Subnet mask: 0.0.0.0
	X1400 CBE30-2 (PROFINET IO)	IP address: 0.0.0.0 Subnet mask: 0.0.0.0

Note

With a **SIMOTION D4x5** control, the Ethernet interfaces (except for CBE-30) have default IP addresses in the delivery state. These addresses are also offered as default IP addresses in the HW configuration.

With a **SIMOTION D410-2** or **D4x5-2** control, only the Ethernet interface X127 has a default IP address in the delivery state. The other Ethernet or PROFINET interfaces obtain their IP addresses by downloading the HW configuration.

6 **Contacts**

Siemens AG
Industry Sector
I DT MC PMA APC
Frauenauracher Strasse 80
91056 Erlangen, Germany
E-mail: profinet.team.motioncontrol.i-dt@siemens.com