SAFECONTROL

Niagara 4 Driver for Siemens S7
User Guide

SAFECONTROL

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SAFECONTROL

Driver Overview

The Safecontrol S7 Driver is written using Tridium's NDriver Framework for use in Niagara 4 or later.

The driver provides support for communication with Siemens PLC's S300, S400 and S1200 series over native S7 Ethernet protocol. The driver reads data from DB part of memory. Supported data formats are: Bit, Word, Short, Double Word, Double Int, Float, Date, String and Printable String.

This help is also connected to the objects in Workbench and you can use the "Guide on target" function in the help or right menu to get more information.

Devices supported by the driver

- Siemens CPU S300 PLC (tested with CPU 313SC)
- Siemens CPU S400 PLC (device not tested but works same as S300 PLC)
- Siemens CPU S1200 PLC (tested with CPU 1212C)

S7 Protocol partial compatibility list								
	CPU						CP	DRIVE
	300	400	WinAC	Snap7S	1200	1500	343/443/IE	SINAMICS
DB Read/Write	✔	✔	✔	✔	✔	✔ (3)	x	✔
EB Read/Write	✔	✔	✔	✔	✔	✔	x	✔
AB Read/Write	✔	✔	✔	✔	✔	✔	x	✔
MK Read/Write	✔	✔	✔	✔	✔	✔	x	x
TM Read/Write	✔	✔	✔	✔	x	x	x	x
CT Read/Write	✔	✔	✔	✔	x	x	x	x
Read SZL	✔	✔	✔	✔	✔	✔	✔	✔
Multi Read/Write	✔	✔	✔	✔	✔	✔	✔	✔
Directory	✔	✔	✔	✔	x	x	✔	2)
Date and Time	✔	✔	✔	✔	x	x	x	✔
Control Run/Stop	✔	✔	✔	✔	x	x	1)	✔
Security	✔	✔	✔	✔	x	x	x	x
Block Upload/Down/Delete	✔	✔	✔	x	x	x	✔	✔

(1) After the “Stop” command, the connection is lost, Stop/Run CPU sequence is needed.

(2) Tough DB are present and accessible, directory shows only SDBs.

(3) See S71200/1500 notes.

The protocol implementation

- Connection to a PLC
- Read system info (only for S300/400 series)
- Read date and time from PLC (only for S300/400 series)
- Read PLC status
- Read block info – auto discover DB (only for S300/400 series)
- Read var – cyclical data reading
- Write var

Prerequisites for integration

1. Correctly installed modules with the driver, see chapter “Installation” for more details.
2. Active license and certificate for the driver on the target platform, see chapter “Licensing” for more details.
3. Physical connection between systems. PLC must be connected to same LAN as JACE 8000 or PC with Tridium Supervisor 4.
4. Known types of points and their offset in DBs and in case of S1200, known block numbers and their Mcc length.

Installation

Source files are available for download from SAFECONTROL license web (https://license.safecontrol.cz). Extract the **s7.zip** archive and copy all included *.jar files to your Niagara modules directory, which is typically **C:\Niagara\Niagara-4.4.xx.xx\modules**.

For correct behaviour it is necessary to install *.jar files on the client platform (Workbench PC) as well as on the target platform (JACE8000 or Supervisor).

Note: Close the Niagara Workbench after inserting all the modules in the folder. Next time you start the Niagara Workbench the driver will be loaded in Niagara Workbench and will be immediately available for use.

Licensing

Driver is license limited by number of connected points. Demo license is limited up to 90 days and purchased licenses are not time limited.

You can ask for license via SAFECONTROL license web (https://license.safecontrol.cz) or by sending e-mail to sales@safecontrol.cz. Purchased license will be generated via Niagara-Central license web where it will be available for download together with safecontrol.certificate file. You can also download license online in Niagara Workbench from license manager view, see picture bellow:

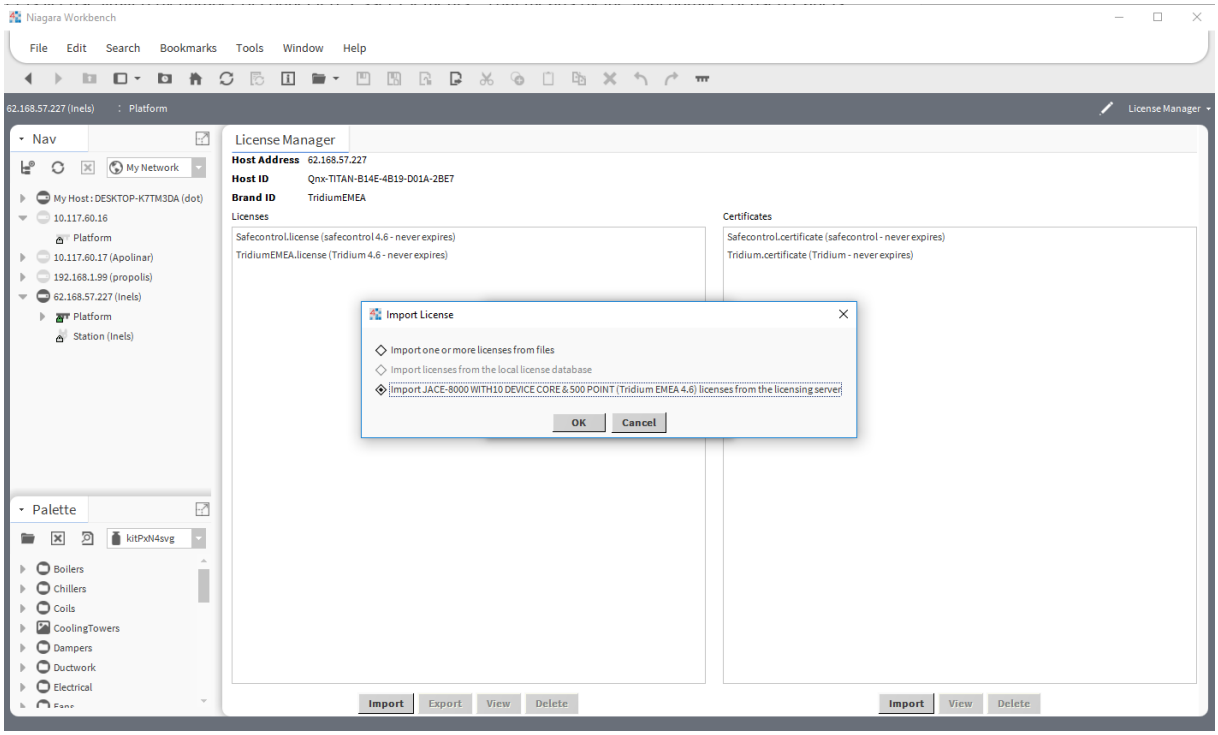

Figure 1: License import via License manager

Order codes

- DR-SC-S7-250 – Driver for integration Siemens S7 PLC – 250 data points
- DR-SC-S7-UNL – Driver for integration Siemens S7 PLC – unlimited data points

Basic config guide

1. Connect PLC to same LAN as JACE 8000 or PC with Tridium Supervisor 4.
2. Add new S7 Network to your Drivers node.
3. Add correct S7 Device to your S7 Network.
4. Correctly configure newly added S7 Device.
5. Add blocks under DBs extension of S7 Device.
6. Add points under added blocks.

For more in-depth help read following chapters.

Setup guide

Overview

An S7 Network represents network interface on Tridium Supervisor 4 or Tridium JACE 8000 used for communication with S7 PLC's over S7 native protocol.

There are located global configuration parameters (poll scheduler, ping monitor, tuning policies...) common for all descendant devices (S7 devices) in the network properties.

Adding a S7 Network to a station

To add an S7 Network perform these following steps:

1. Connect S7 to same LAN as JACE 8000 or PC with Tridium Supervisor 4.
2. Open the station and expand the nav tree.
3. Double click on the Drivers node.
4. In the Driver Manager window click the “New” button. Select S7 Network from the drop-down list and click Ok.
5. Enter a name for the network and click Ok.

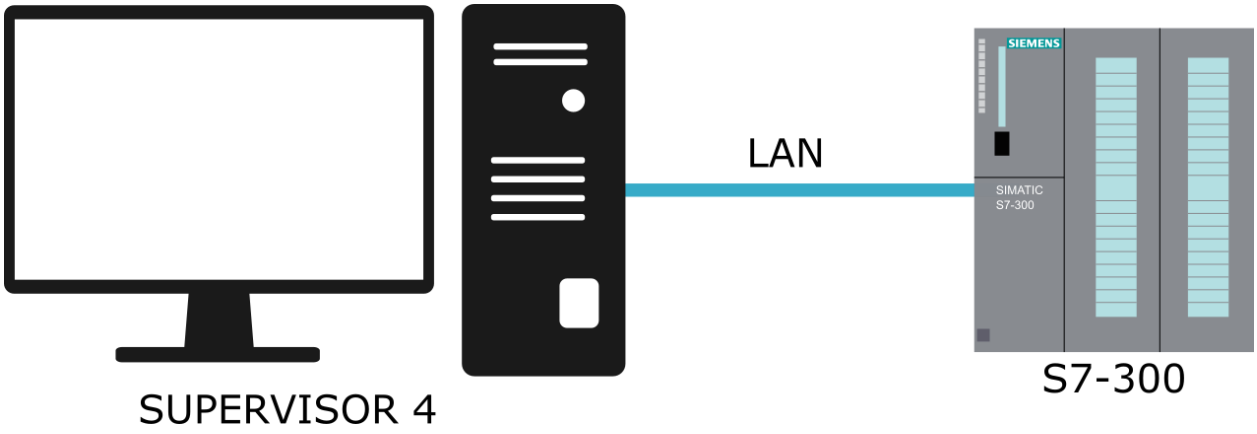

Figure 2: Diagram of connection to Supervisor 4

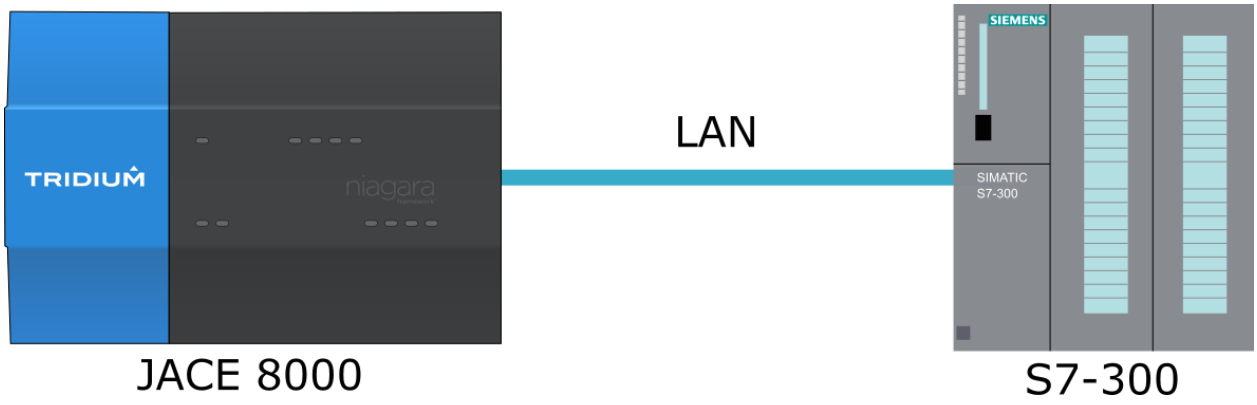

Figure 3: Diagram of connection to JACE 8000

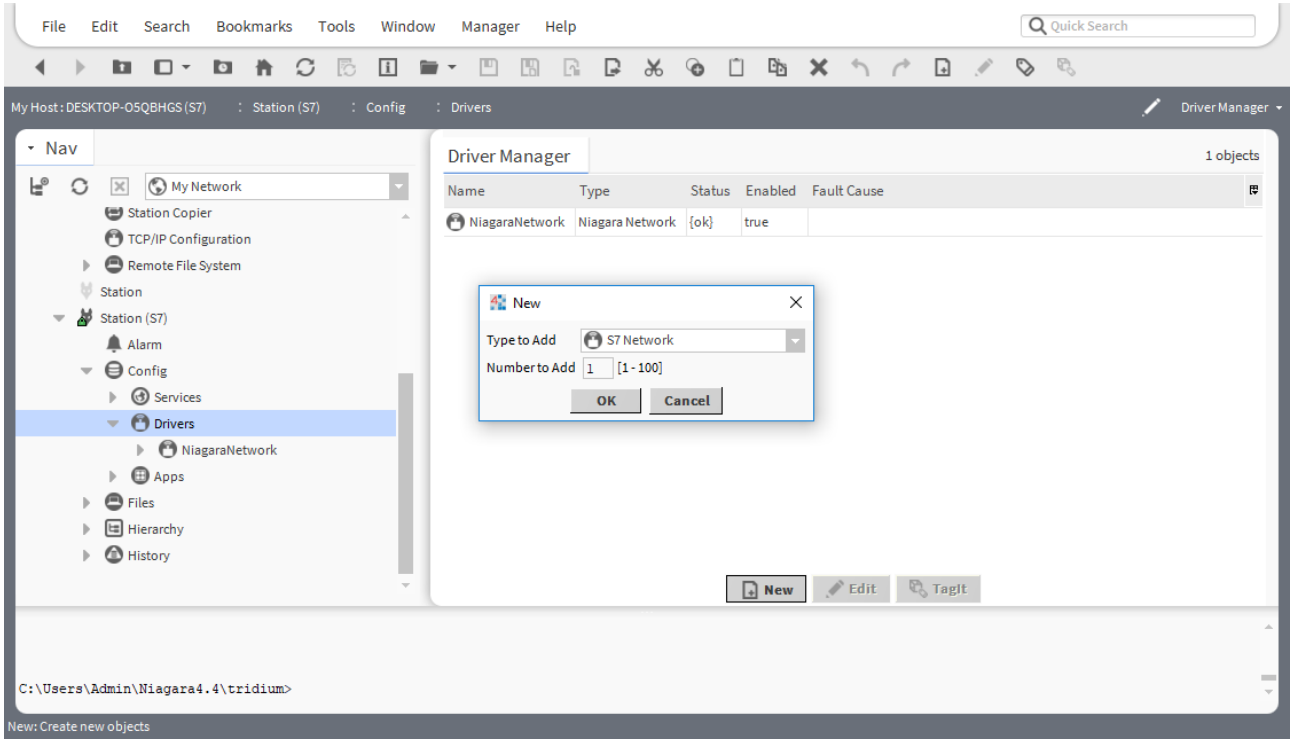

Figure 4: Adding a new network

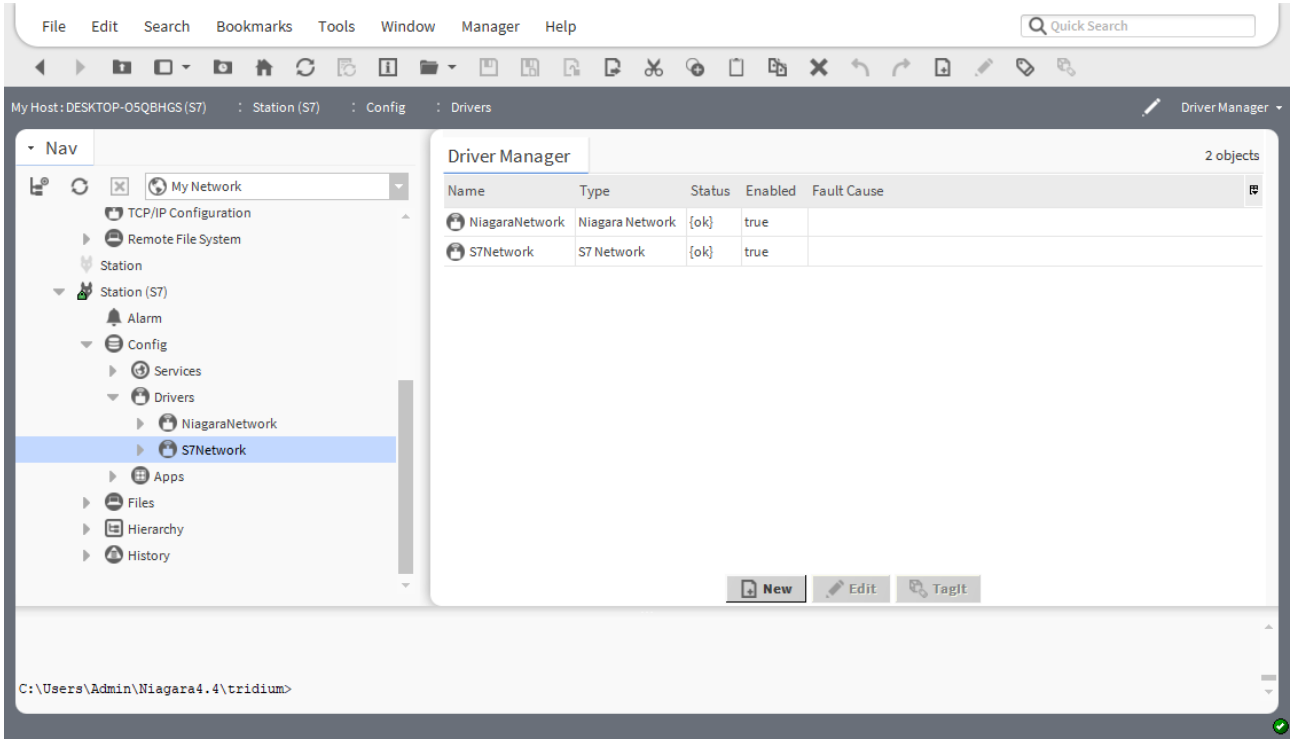

Figure 5: Successfully added S7 Network

Status {ok} indicates that the Niagara 4 platform has installed all required modules, licenses and certificates. Otherwise read paragraph licensing in the Driver Overview.

By double clicking S7 network in Driver Manager you will see S7 Device Manager with blank table of devices.

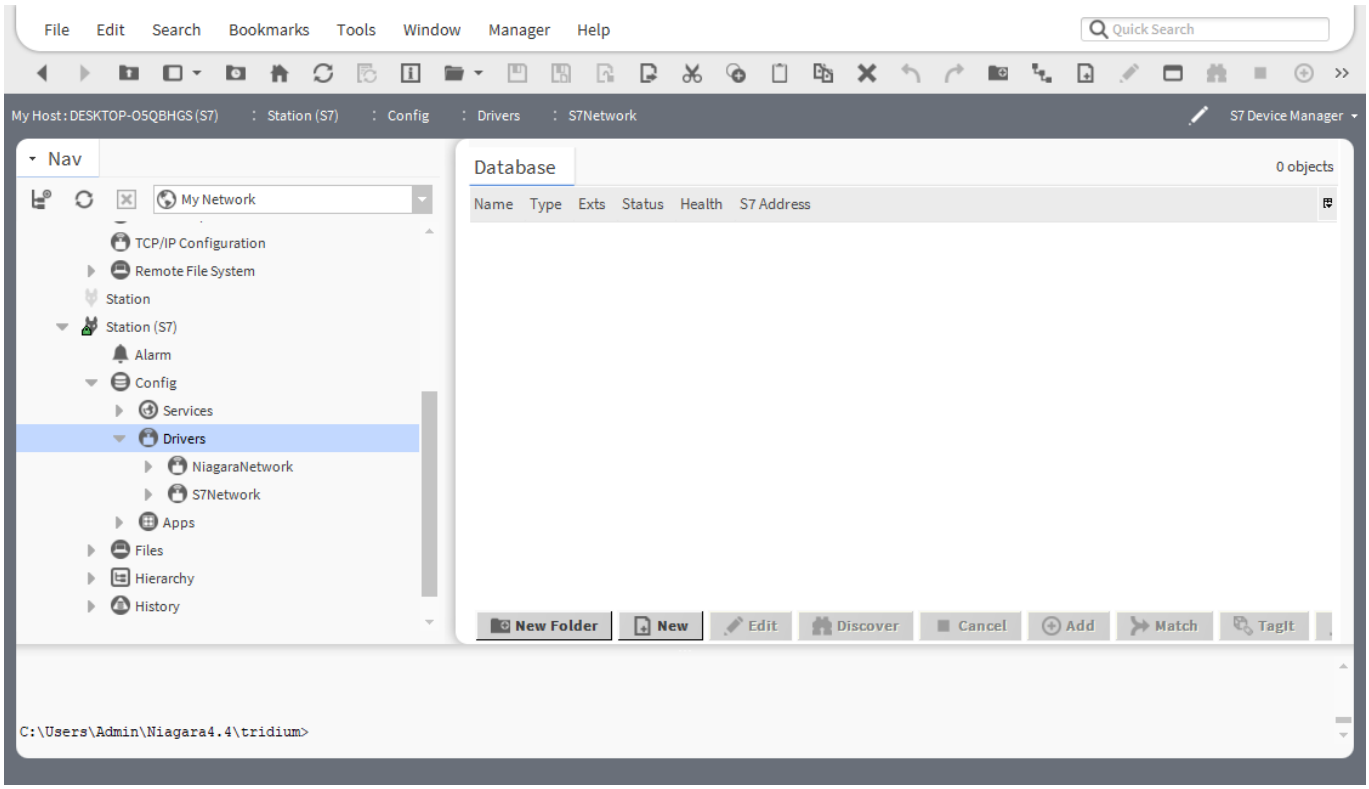

Figure 6: Empty S7 Network

Configuring an S7 Network

In the S7 network property sheet is located common settings for all descendants (S7 devices). Ping monitor and global poll scheduler are shared for all devices under S7 network. You can choose for each device a poll rate (slow, normal, fast) defined in this property sheet.

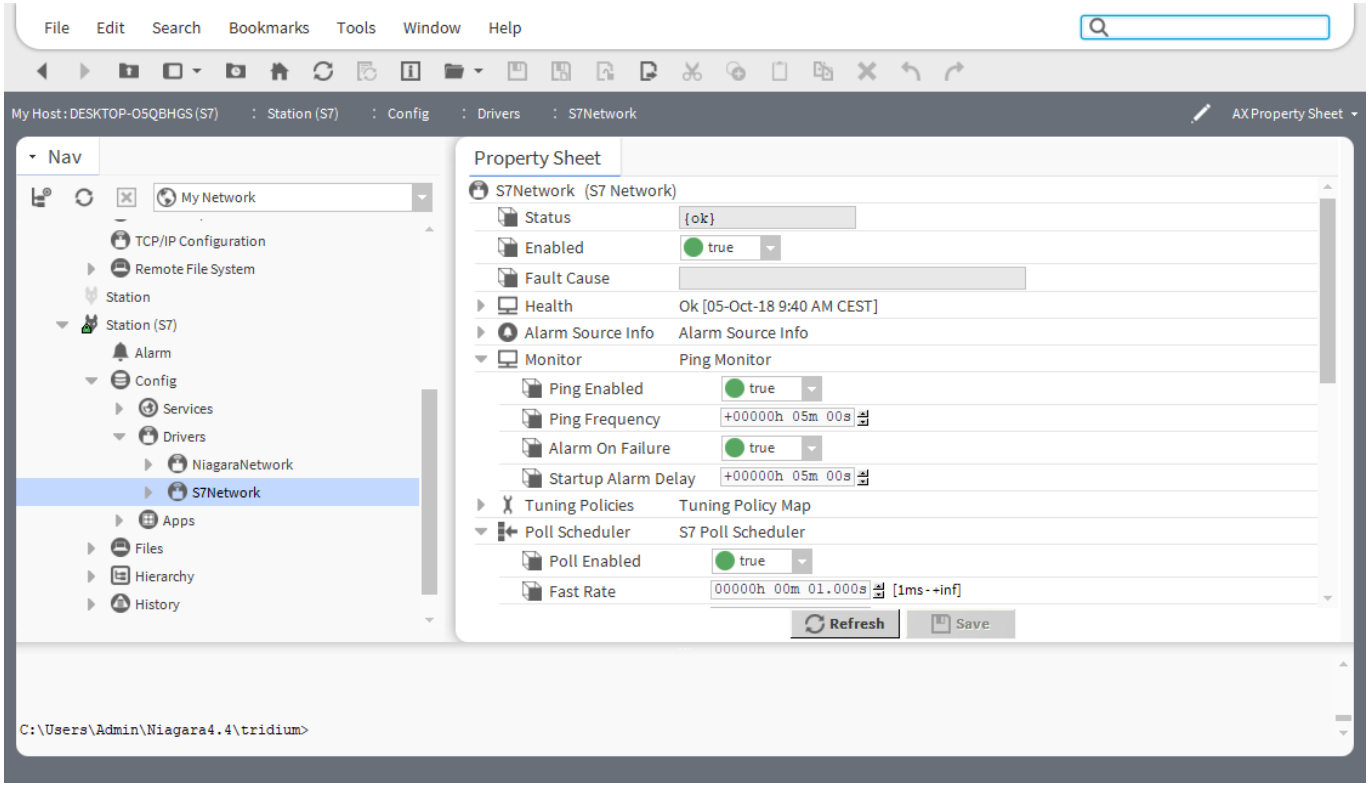

Figure 7: Property Sheet of the S7 Network - global communication parameters

S7 Device Manager

S7 Device Manager is the primary View on the S7 Network component (You can open it by double-clicking on S7Network in nav tree). The manager provides a table view of all devices under the S7 network.

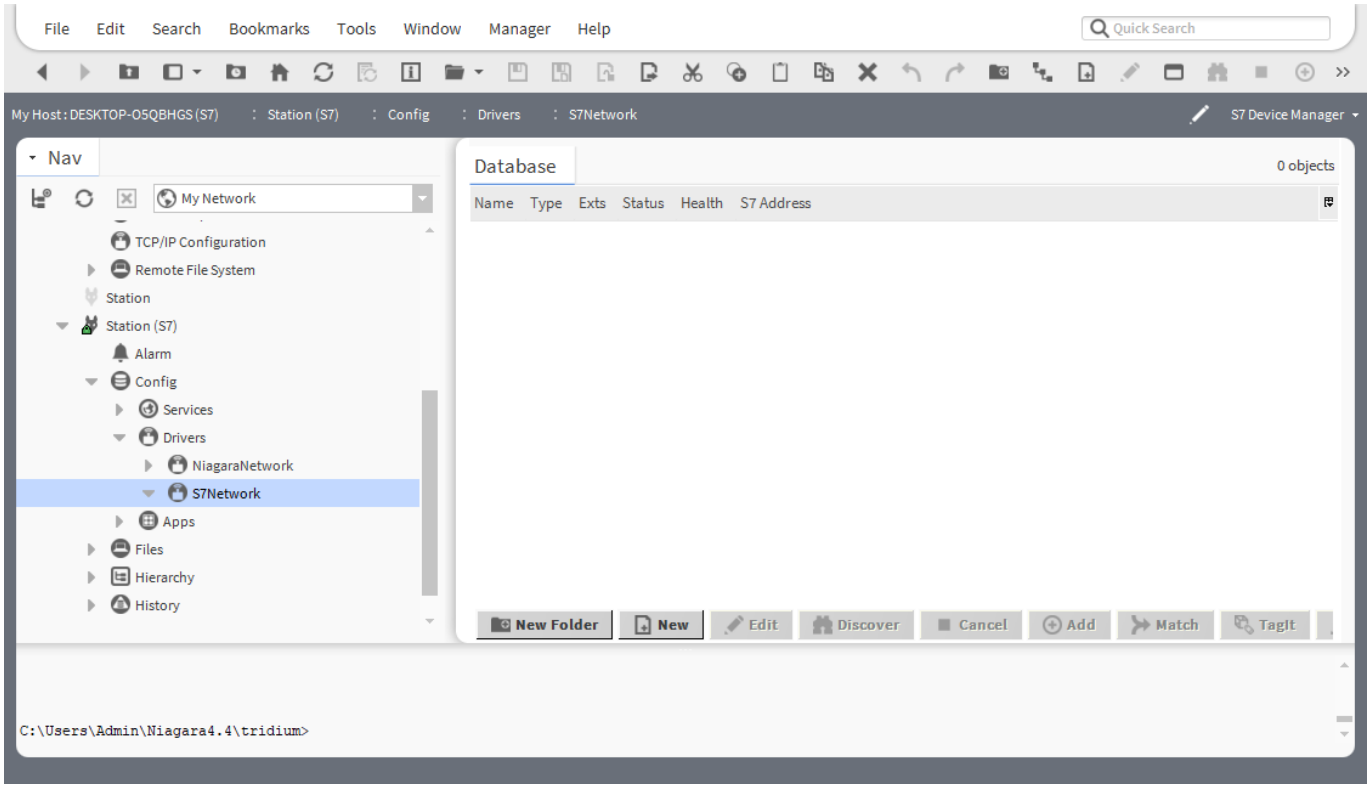

Figure 8: S7 Device Manager

S7 Device Manager provides set of control buttons in the bottom of the View:

- **New Folder** – This will create new folder of type S7 Device Folder meant for custom ordering of Devices.
- **New** – With this button you can create new S7 device. Carefully fill the pop-up window for successful connection to PLC.
- **Edit** – (Same as double-click on device) you can edit names of selected device and connection parameters.
- **Discover** – This button is disabled in current release.
- **Add/Cancel** – This button is disabled in current release.
- **Match** – This button is disabled in current release.

Adding new S7 devices to the Station

To insert new device in the S7 network perform these following steps:

1. Open S7 device manager.
2. Click the “New” button.
3. Select the S7 PLC 300, S7 PLC 400 or S7 PLC 1200 from drop down box and click “OK” button. In case of S1200, the device has to be in 300/400 compatibility mode.
4. Set the parameters of the device in the following window. Keep attention to correct settings of the S7 Address.

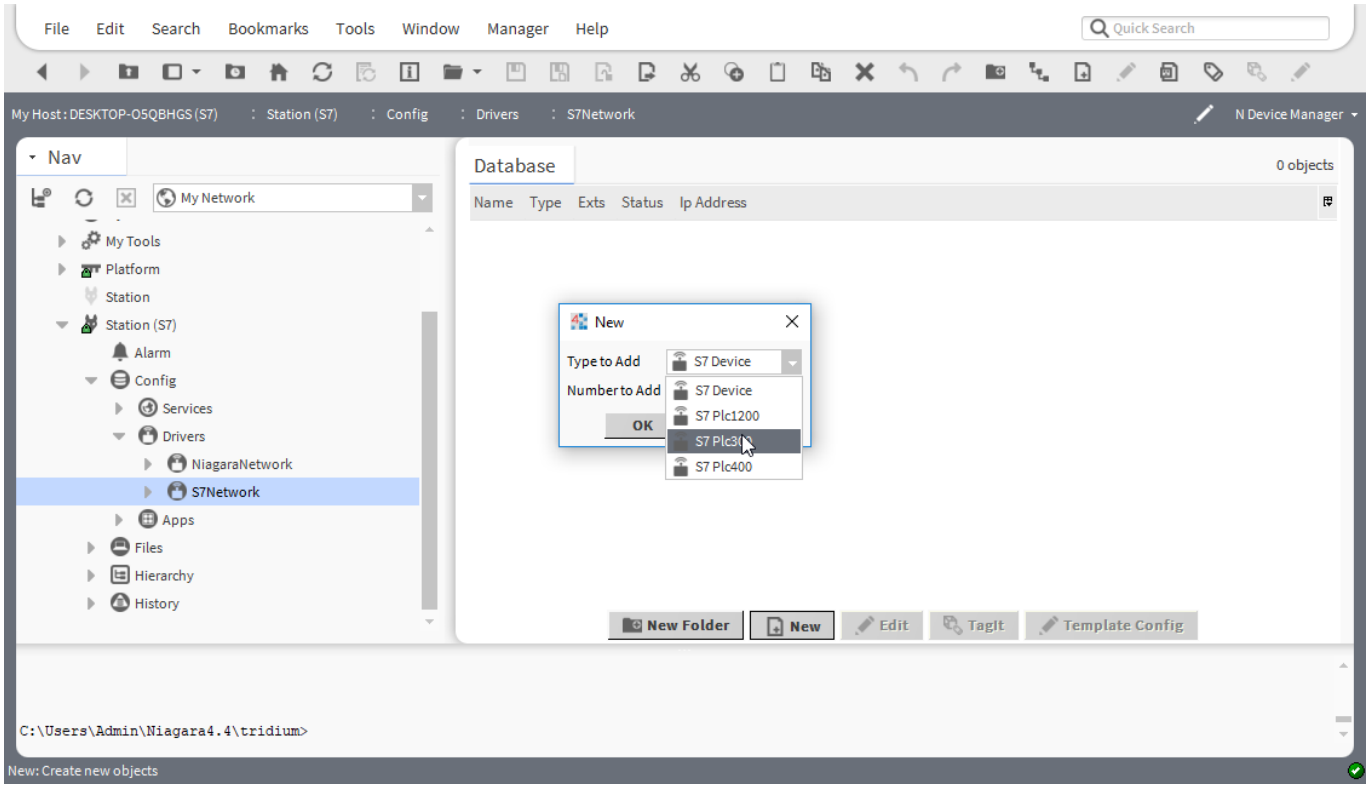

Figure 9: Adding a S7 device to the S7 Network

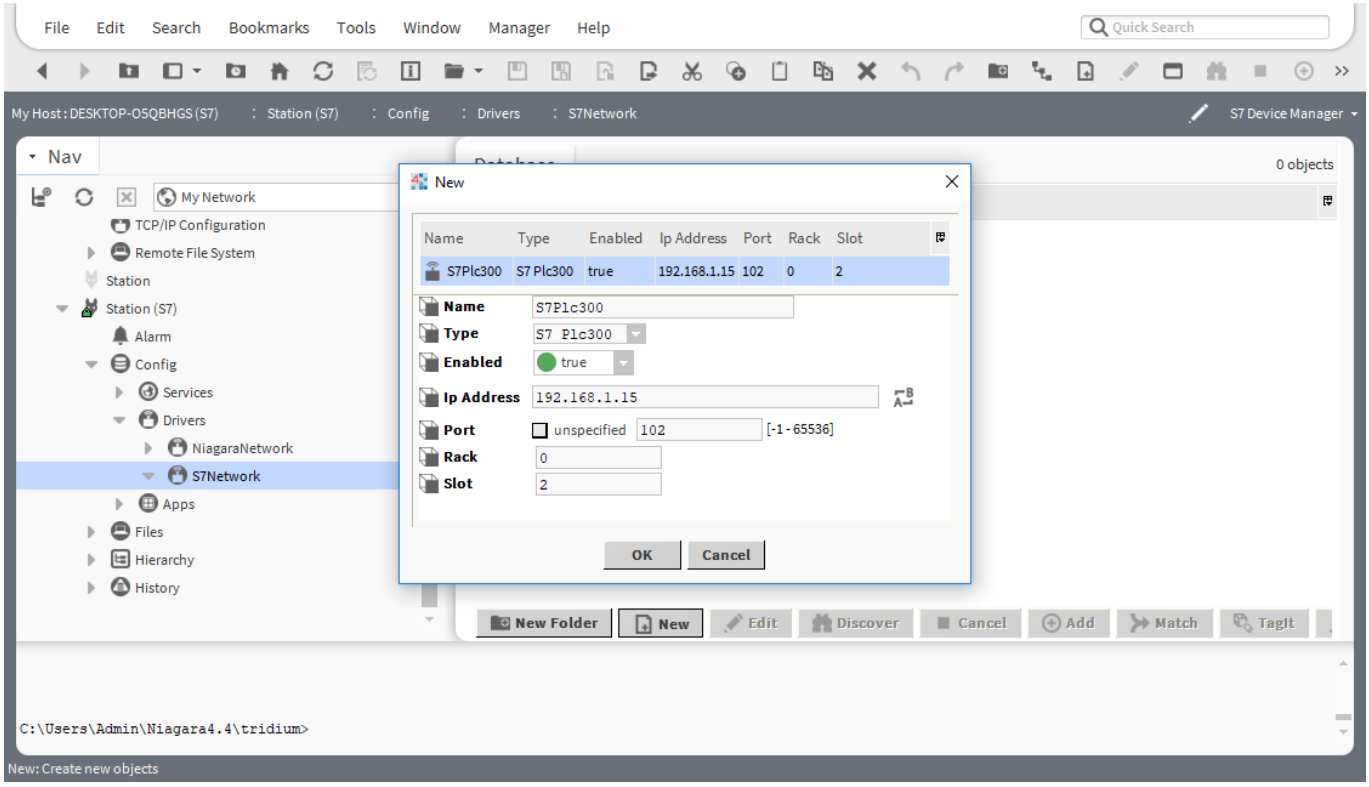

Figure 10: New S7 Device configuration menu

For the S1200 it is necessary to change Slot value to „1“. Name is optional. IP address must correspond to address of the PLC and keep other parameters default in most cases.

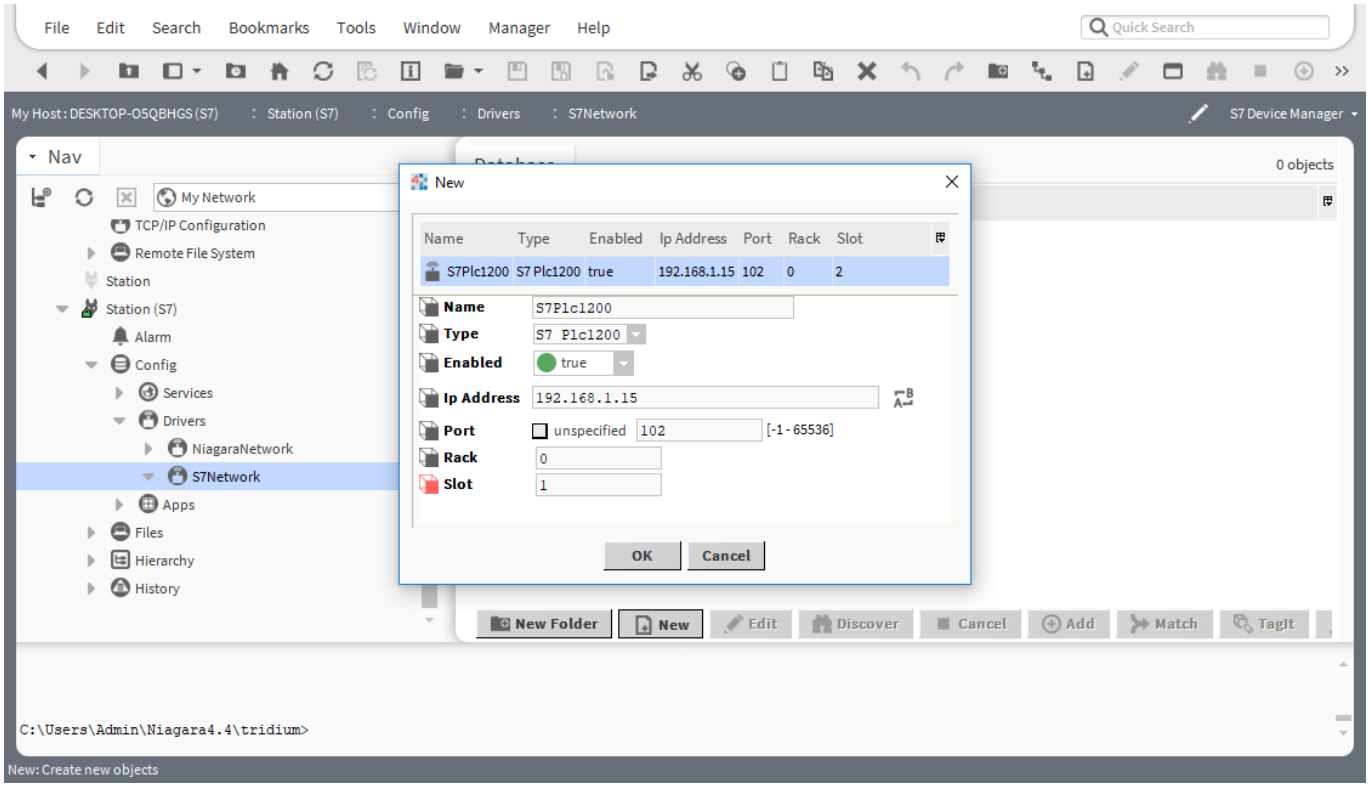

Figure 11: Configuration of S1200

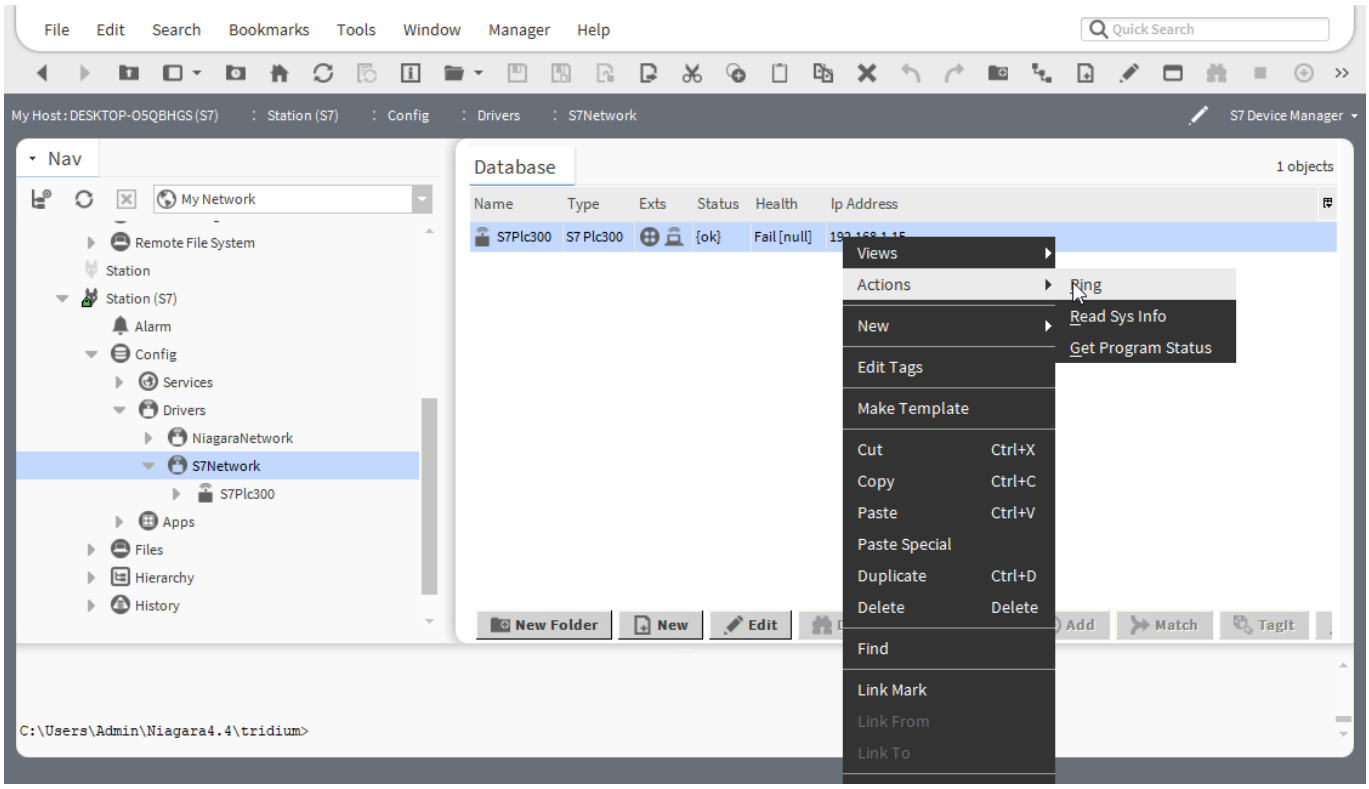

Figure 12: Ping Action on S7 Device

Note: In some cases, it is necessary to initiate communication by pinging the device after adding

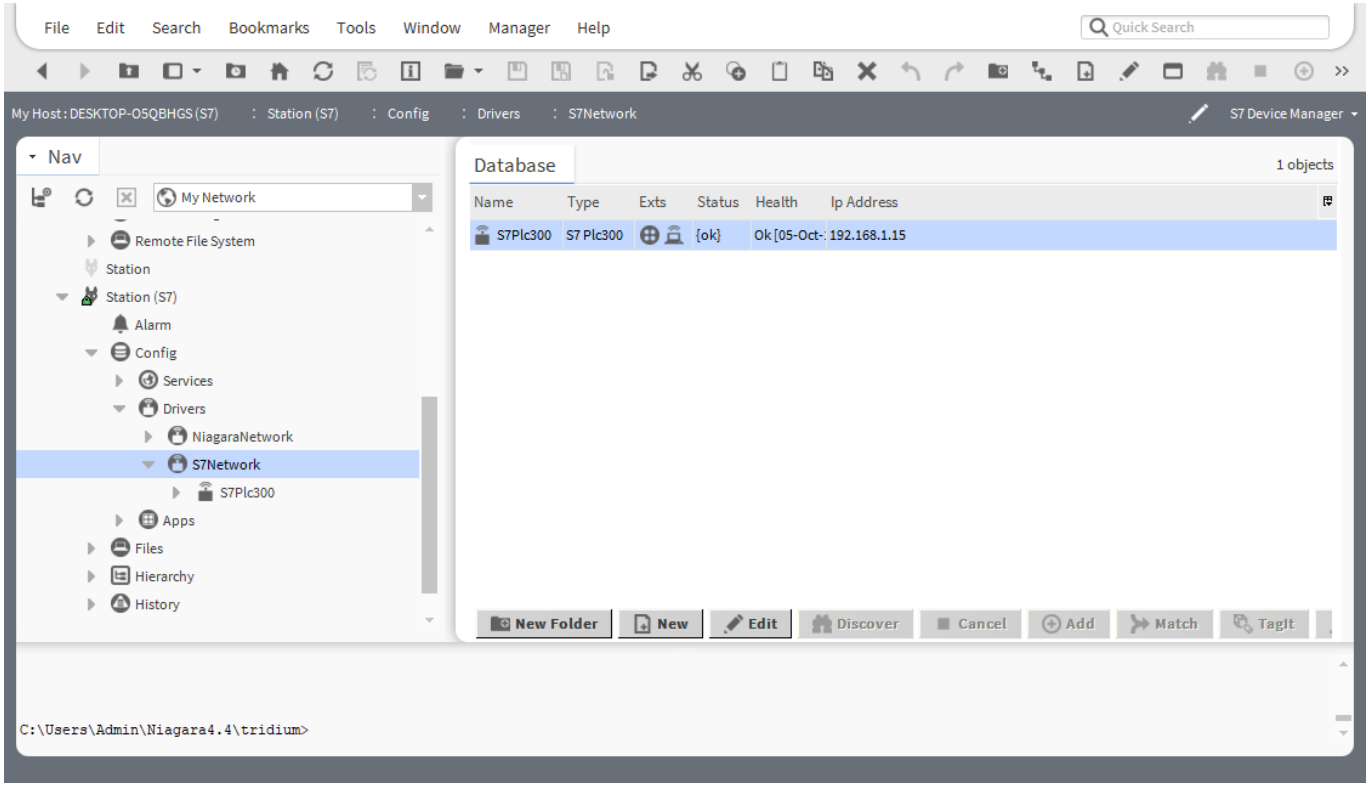

Figure 13: Health parameter of device should read ok

S7 Device

S7 Device represents the physical PLC. You can choose S7 Plc300, S7 Plc400 or S7 Plc1200. By double clicking the device in the device tree is opened S7 device property sheet. You can set some parameters here (most important is Poll frequency) and read some information about PLC and communication. From the context menu are accessible actions for pinging the device, read system info and get program status. System time and full system info does not have to be accessible for all types of S7 PLC.

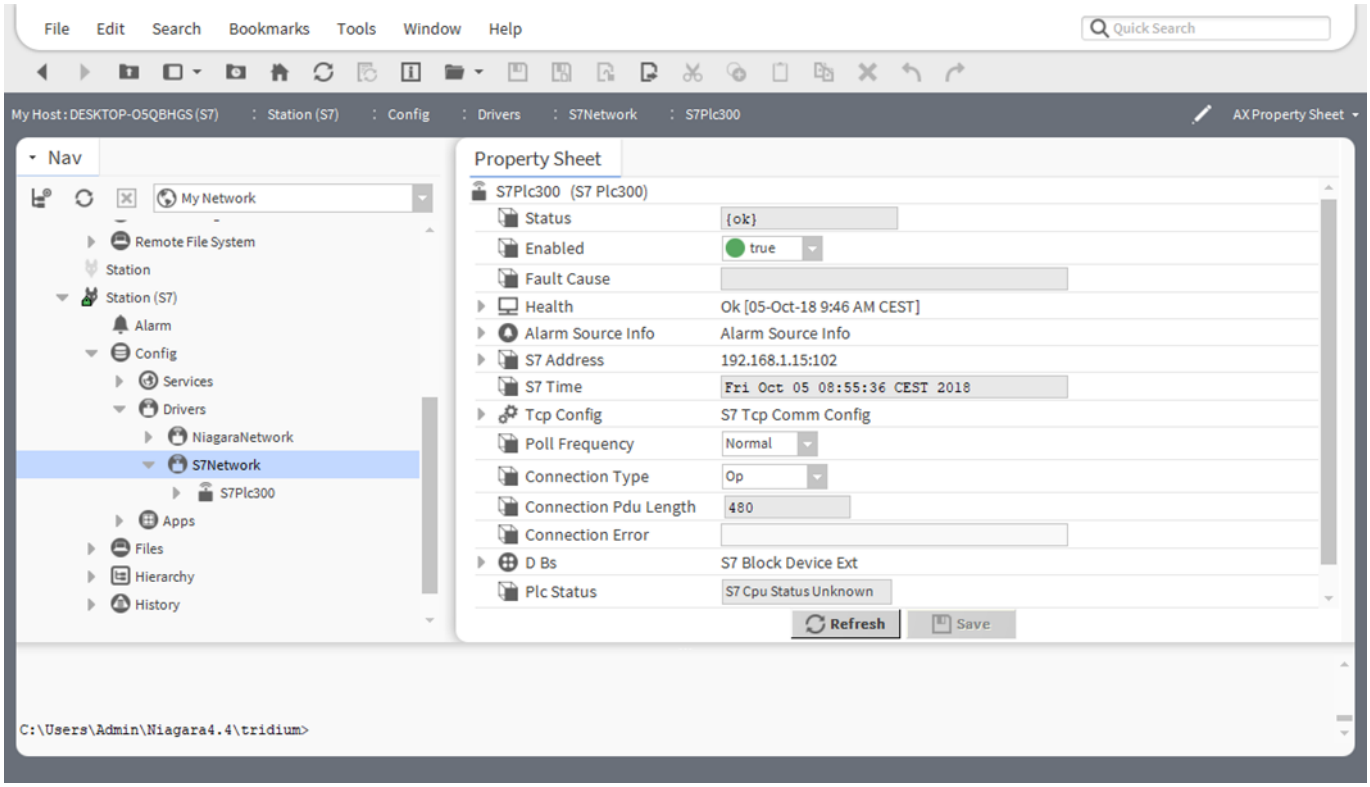

Figure 14: Device property sheet

S7 DBs

DB is part of PLC memory in which are stored program variables. Each DB has own address (Number), length (Mcc length is number of accessible bytes in the DB) and further parameters.

The request for the data consists of the Block Number and Mcc length. All data in DB are read in one poll cycle. You can see the raw data under the property Data as well as set the poll rate settings. Each DB has its own poll rate settings – you can set slow rate for DB with lower priority and fast rate for most important data or data which request short response time. The poll rates details are defined in S7 network property sheet.

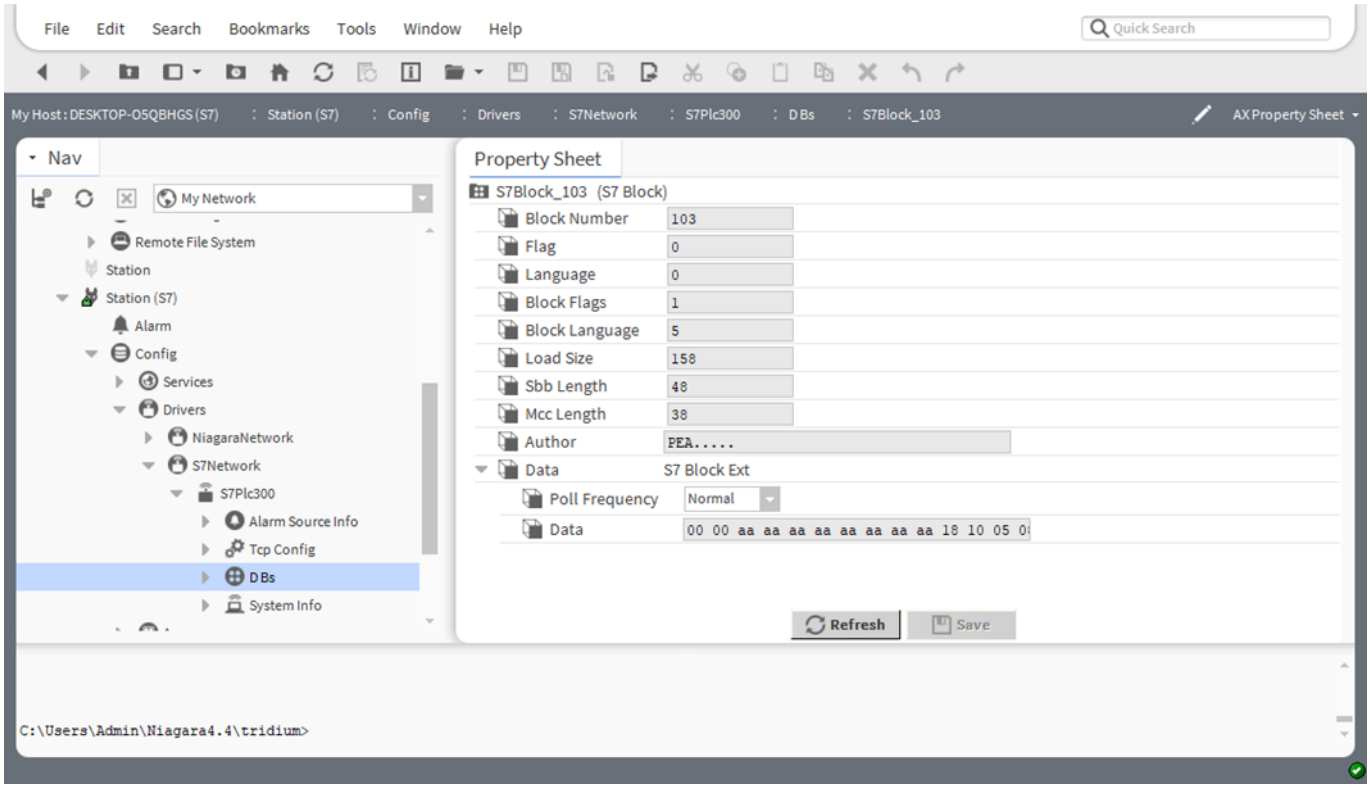

Figure 15: DB property sheet

S7 Block Manager

S7 Block Manager is accessible by double clicking on the “DBs” property under the S7 Device. There are two different managers, for S300 PLC, S400 PLC and for S1200 PLC.

The S300 PLC and S400 PLC supports the automatic DB discovery. For the auto discovery follow these instructions:

1. Open S7 Block Manager.
2. Click the “Discovery” button.
3. Check the result in status bar at the top of S7 Block Manager.

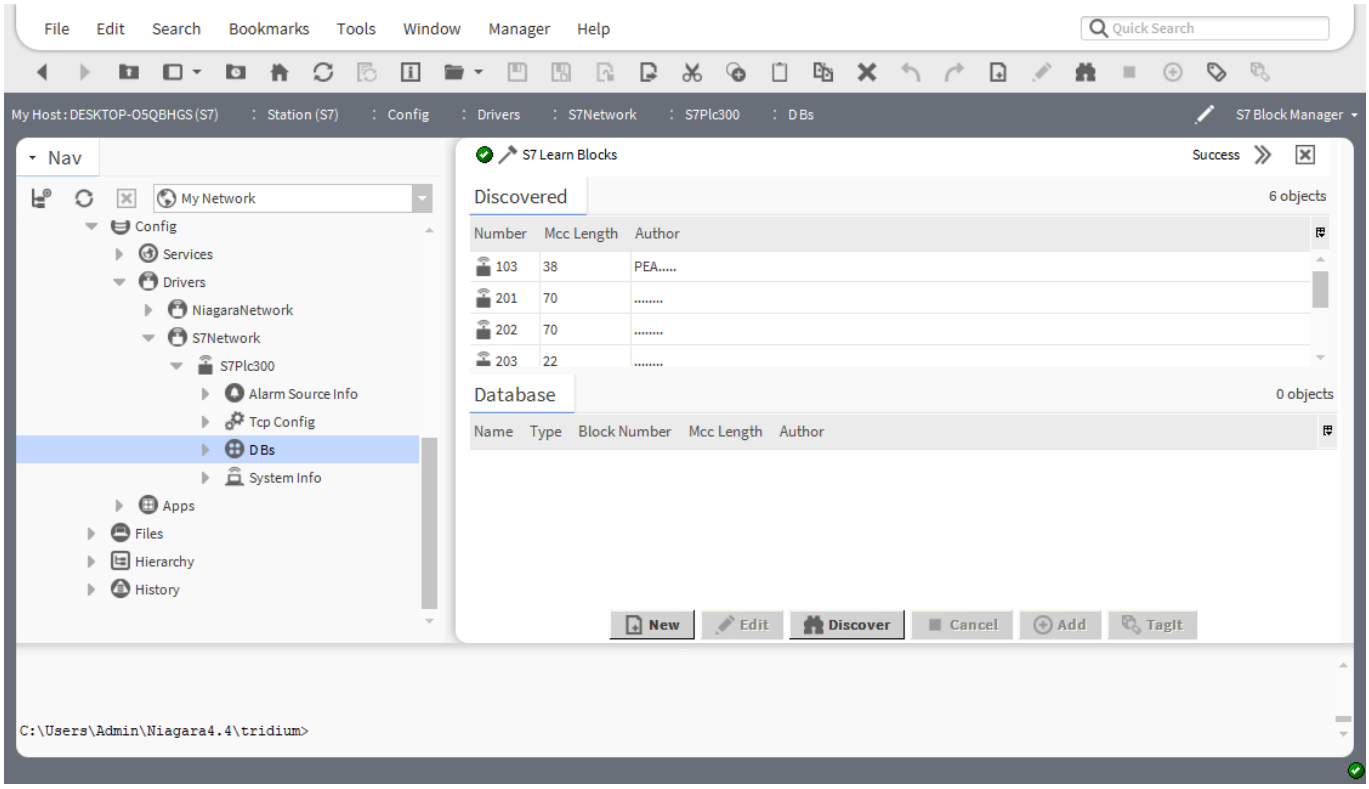

Figure 16: Block manager and successful discovery result

Manual adding of DB

This function is available for S1200 PLC, S300 PLC and for S400 PLC offline configuration. For the manual DB add perform these following steps:

1. Open S7 Block Manager.
2. Click “New” button.
3. In the first appearing window se the number of adding DBs.
4. In the second window fill correct **block number** and **Mcc length**.

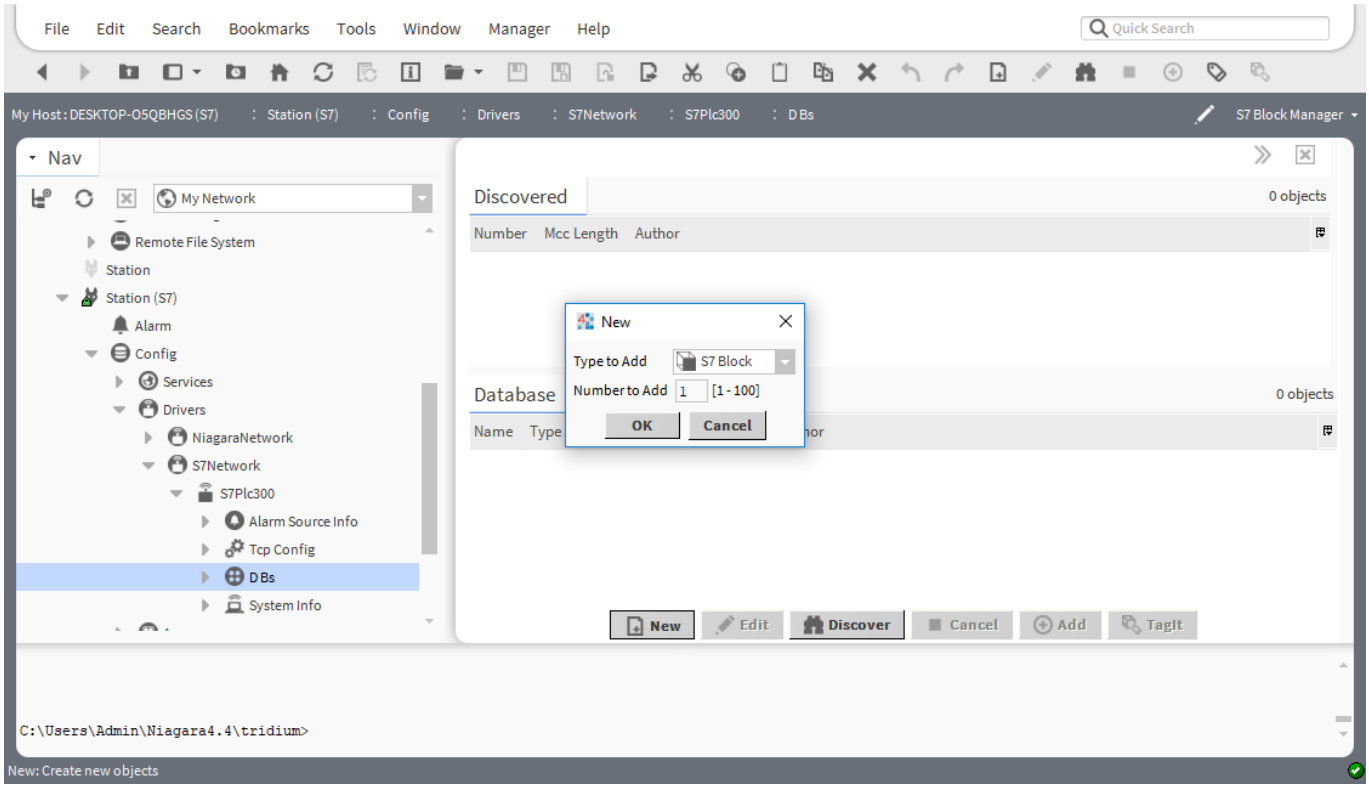

Figure 17: New Block dialog menu

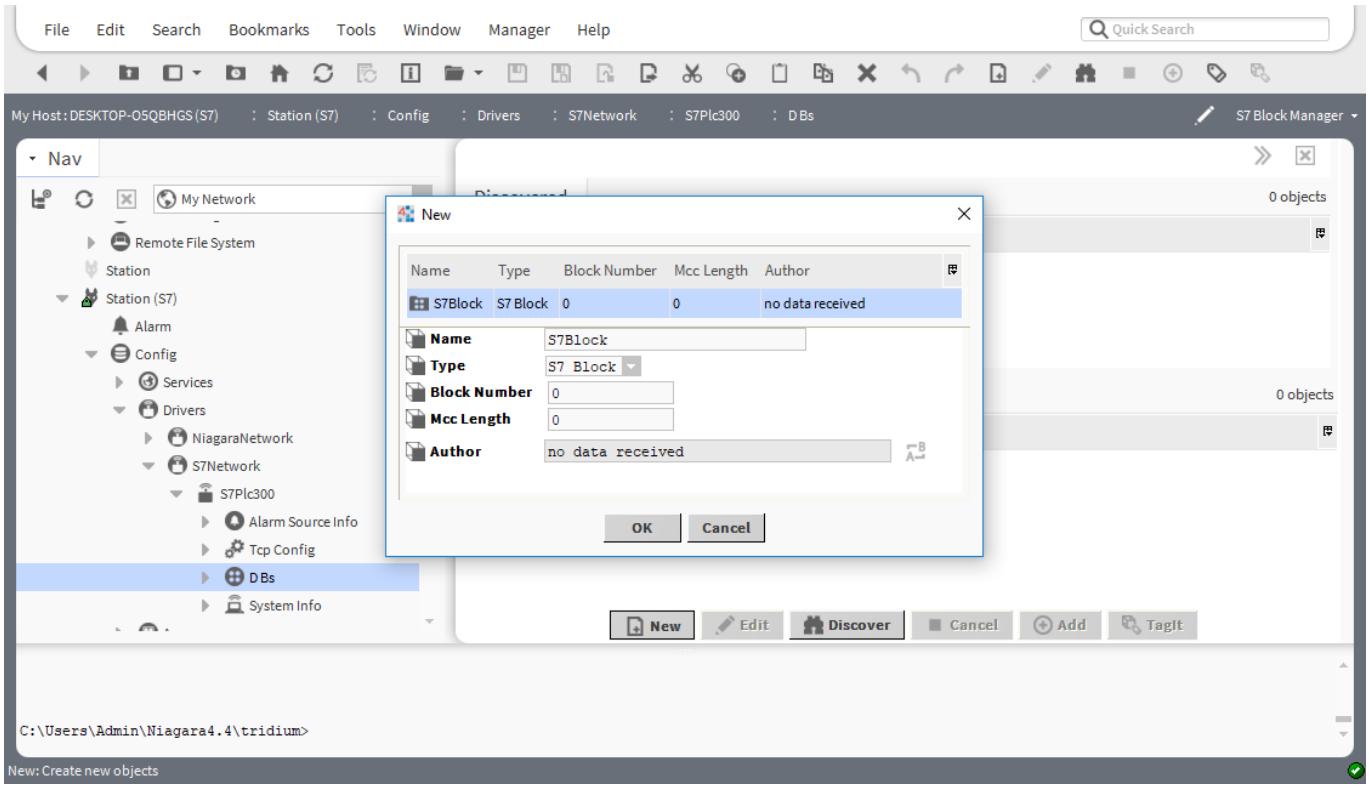

Figure 18: New Block configuration

S7 Points

S7 Control points have to be added manually from S7 Point Manager under the DB.

Adding a new S7 Point

1. Open S7 Point Manager by double clicking selected DB.
2. Click the “New” button.
3. Choose the required data type in first appearing window.
4. Set starting offset for the point in selected DB (offset is counted in bytes).
5. For the bit points/writable is necessary to set required bit offset (position in the byte) in the point proxy Ext.

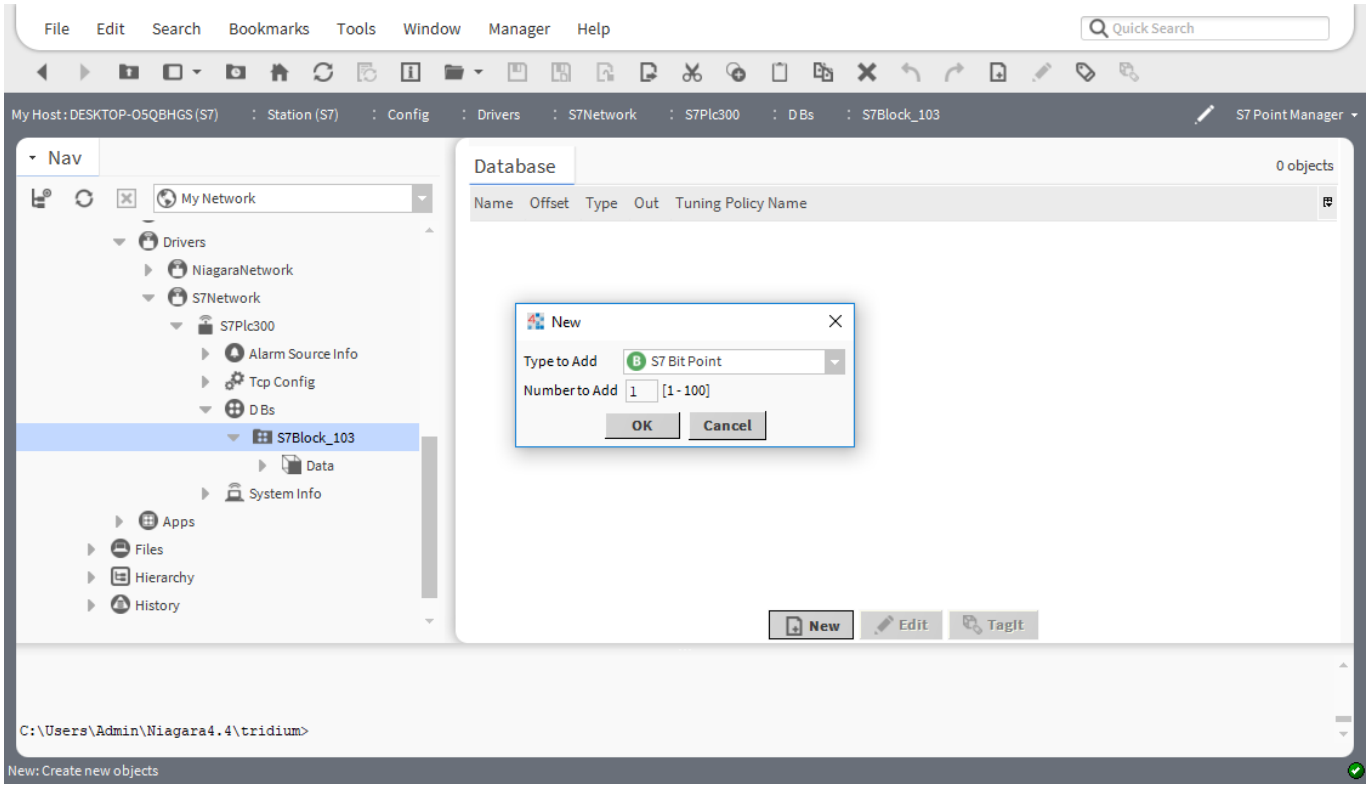

Figure 19: Adding a new S7 point

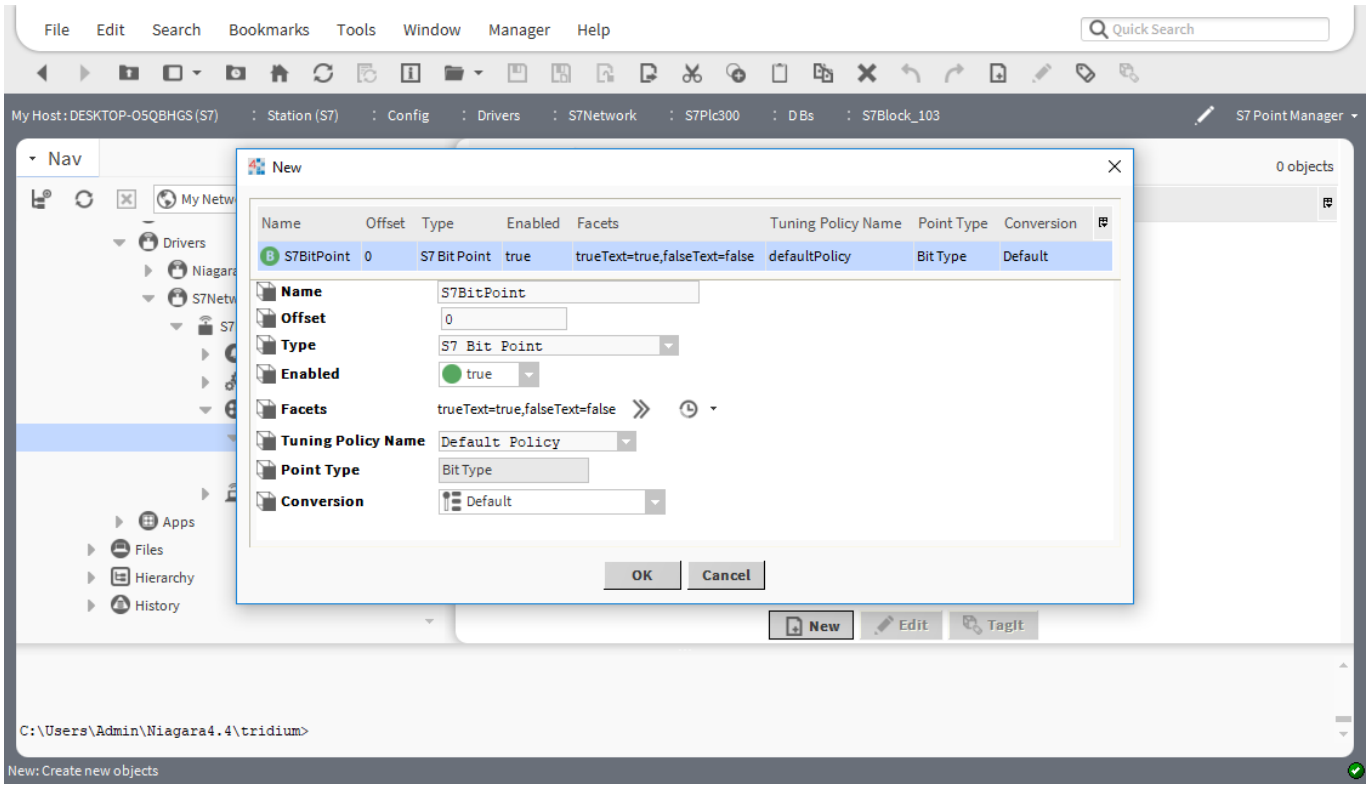

Figure 20: Set start offset in the DB

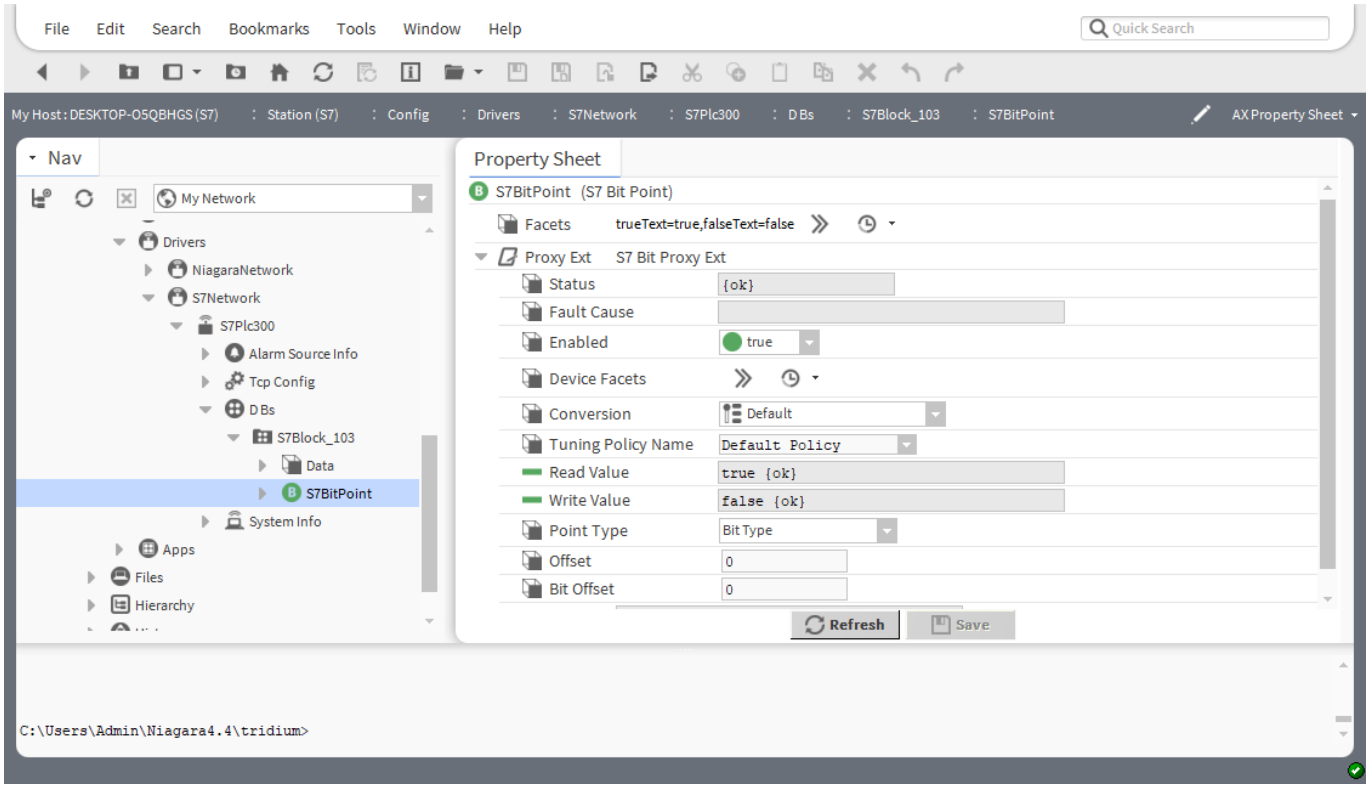

Figure 21: Set bit offset in the byte

Siemens data representation in Niagara:

S7 Data Type	Niagara Control Point
Bit	Boolean Point / Boolean Writable
Short	Numeric Point / Numeric Writable
Word	
Double Word	
Float	
Date	String Point / String Writable
String	
Printable String	

FAQ

Q: The driver doesn’t establish communication with S1200 PLC.

A: Check the IP address and set the slot number to “1”.

Q: How to set bit offset for the bit point / writable?

A: Open the proxy Ext under bit point property sheet and set the required offset in the property Bit offset.

Q: Can I add the DB manually without connected PLC?

A: Yes, all the points can be added manually before installation on site.

Q: The data in DB are empty or the point under DB in in fault.

A: Check the Block Number and Mcc length with the program in S7 PLC. Check the property Point Type under point Proxy Ext.