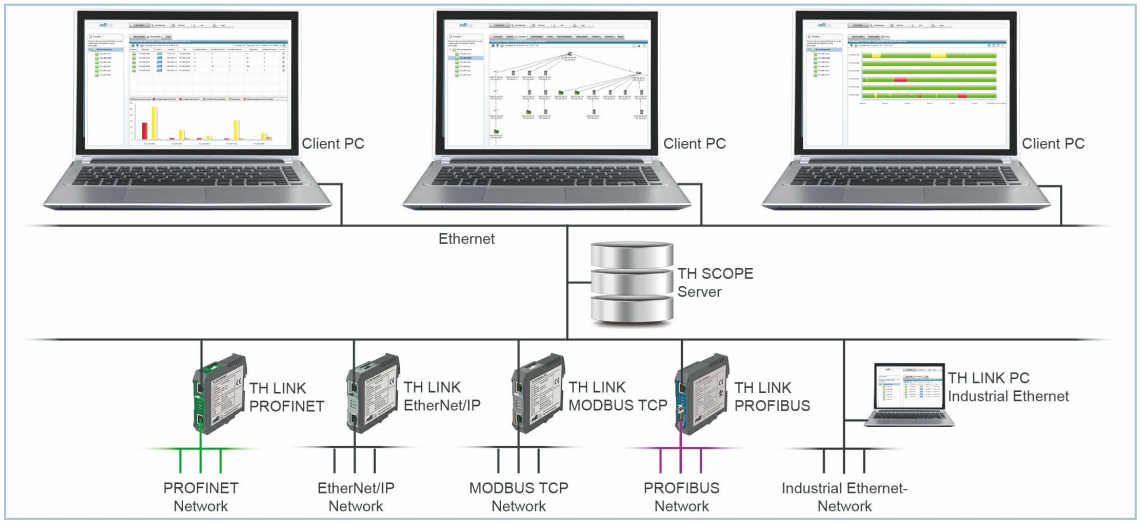
User Manual

TH SCOPE

Monitoring and Diagnostics of PROFINET, EtherNet/IP and Modbus TCP Networks



Version: EN-082015-1.30

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The information contained in these instructions corresponds to the technical status at the time of printing of it and is passed on with the best of our knowledge. The information in these instructions is in no event a basis for warranty claims or contractual agreements concerning the described products, and may especially not be deemed as warranty concerning the quality and durability pursuant to Sec. 443 German Civil Code. We reserve the right to make any alterations or improvements to these instructions without prior notice. The actual design of products may deviate from the information contained in the instructions if technical alterations and product improvements so require.

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Table of Contents

1 Introduction

1.1 About the TH SCOPE

TH SCOPE is a diagnostics software for PROFINET and Industrial Ethernet which can simultaneously monitor multiple fieldbus networks and communication protocols in one single application.

1.2 Product history

Product version	Release date	Modifications compared to previous version
2.0	September 2014	For details refer to Release Notes
2.1	January 2015	New product version 2.1. For details refer to Release Notes.
2.2	April 2015	New product version 2.2. For details refer to Release Notes.
3.0	August 2015	New product version 3.0. For details refer to Release Notes.

1.3 About this manual

This User Manual explains the use of TH SCOPE. Main focus are the functions of the graphical user interface. Also examples are given to show how to find and interpret network errors with the software.

Read this manual before starting.

For damages due to improper connection, implementation or operation Softing refuses any liability according to our existing guarantee obligations.

Conventions used

The following conventions are used throughout Softing customer documentation:

Keys, buttons, menu items, commands and other elements involving user interaction are set in bold font and menu sequences are separated by an arrow	Open **Start → Control Panel → Programs**
Buttons from the user interface are enclosed in brackets and set to bold typeface	Press **[Start]** to start the application
Coding samples, file extracts and screen output is set in Courier font type	`MaxDlsapAddressSupported=23`
Filenames and directories are written in italic	Device description files are located in *C:\StarterKit\delivery\software\Device Description files*

Note

This symbol is used to call attention to notable information that should be followed during installation, use, or servicing of this device.

Hint

This symbol is used when providing you with helpful user hints.

1.4 Document history

Document version	Release date	Modifications compared to previous version
1.00	September 2014	Adaptation to new Softing documentation structure and layout
1.10	January 2015	▪ Enhanced Feature "Utilization" in the Topology list including related description. ▪ Adobe Flash Player system requirements modified to version 14.0 or higher.
1.20	April 2015	▪ Sections "Using device description files 7", "Licensing - TH LINK, Demo- and TH SCOPE license 9" and "Diagnostics list (also TH LINK) 37" enhanced with information on GSDML file support.
1.30	August 2015	▪ HTML 5-Implementation ▪ Adobe Flash-Player is no longer required.

2 General information

2.1 Preconditions

- The TH SCOPE software has been installed successfully.
- The TH SCOPE measurement must have been started for each TH LINK. Check whether measurement has been started. To do so click **Info**. Make sure **Measurement started** is displayed below **TH SCOPE**.
- If the measurement is not started, go to **Settings → TH SCOPE → Measurement** and click on **Start**.

2.2 Preparation

2.2.1 Using device description files

TH SCOPE supports for PROFINET the use of GSDML files. It analyzes the hexadecimal values of the manufacturer-specific diagnostics messages and the error codes of channel diagnostics and display them in plain text. The diagnostics messages are displayed in the diagnostics list. If the GSDML file includes troubleshooting tips, they are displayed in the diagnostics list as well.

How to proceed

1. Store the GSD or GSDML files in the corresponding folder in the TH SCOPE installation directory (see figure below).
2. Then reboot your PC. If you are administrator on the PC, restart the TH SCOPE service.
3. Thus GSDML files will be integrated via TH SCOPE.

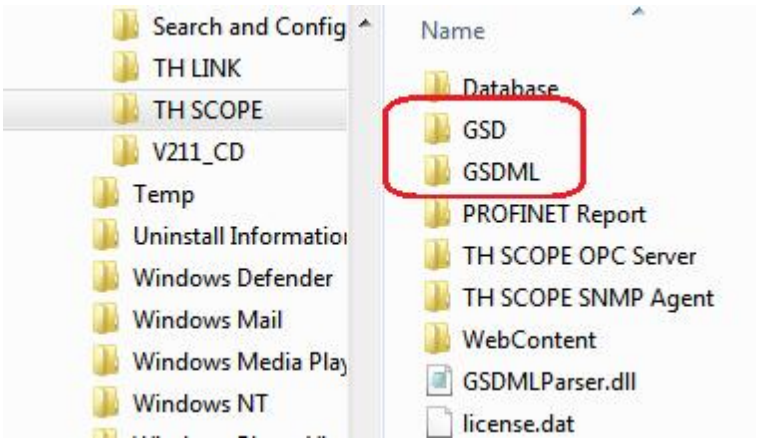


Figure 1: GSDML folder in TH SCOPE default directory

2.2.2 Display of device images in the topology

If you want to display device images in the topology, you need to store the images in the following folder:

<Installation directory>\Softing\TH SCOPE\WebContent\Bitmaps

Note

A double-click on the bitmap link will take you directly to the correct folder.

Supported file types for the device images are: **.png*, **.jpg*, **.gif*.

Note

Make sure that a single image is not larger than 50 KB.

The device images have to be named in one of the following forms. Vendor ID and Device ID are the leading identification. The notation is as follows:

Vendor ID - Device ID of the device in hexadecimal.

- Example: 002A-0302
- Advantage: each device can get its own image.

Alternative file names (if no Vendor ID and Device ID is available):

Identification	Notation	Example	Advantage
MAC adresse of the device	The MAC address has to be divided by hyphens (other characters are not allowed)	00-0E-8C-D0-50-46	Each device can get its own image, if no vendor ID or Device ID is available.
Manufacturer specific part of the MAC address of the device	The MAC address part has to be divided by hyphens (other characters are not allowed)	00-0E-8C	Several devices from one manufacturer can use the same image, if no Vendor ID or Device ID is available.
Order number of the device	Order number code - for specific restrictions see note below.	1846-56482	Several devices with the same device type can use the same image, if no Vendor ID or Device ID is available.

Note

All characters which must not be used in Windows file names such as \ / : * ? " < > | have to be replaced by a hyphen.

Example

read order number is: 1846/56482

file name has to be modified to: 1846-56482

2.3 Licensing - TH LINK, Demo- and TH SCOPE license

Without a license, you may only use the features of TH LINK, which are part of the free-of-charge part of the TH LINK. You need to acquire a license to enable all features of TH SCOPE. A limited 30-day demo license is available.

The following table shows the features available with each TH SCOPE version.

Function	TH LINK	TH SCOPE license
Network overview	x	x
Network and device status	x	x
Diagnostics messages	x	x
Analysis of device log books	x	x
Live List	x	x
Statistics	x	x
Inventory	x	x
E-Mail notification	x	x
Tabular Topology	x	x
graphical topology	-	x
Data export	-	x
Printing	-	x
Determine and compare reference configuration	-	x
Trend analysis	-	x
GSD file support (only for PROFINET)	-	x
OPC Server DA	-	x
SNMP agent	-	x

Note

You can find information about the licensing procedure in the TH SCOPE installation manual.

2.4 User roles

There are two roles: user and administrator. The following table gives an overview about the roles and their corresponding rights.

Functions	User	TH LINK Administrator	TH SCOPE Administrator
Navigation through all levels and views	x	x	x
Perform reference comparison	x	x	x
Perform export for spreadsheet calculation	x	x	x
Display TH LINK settings	x	x	x
Modify TH LINK settings	-	x	-

Functions	User	TH LINK Administrator	TH SCOPE Administrator
Delete TH LINKs that cannot be reached in the network for more than 5 minutes.	-	x	-
Modify TH LINK detection procedures	-	-	x
Modify SNMP agent configuration	-	-	x

Hint

You have to login separately to each TH LINK to change the TH LINK-specific settings. For information about the default password of the TH LINK refer to the installation manual of the respective TH LINK.

You can find the TH SCOPE default password in the following section (see Login 10).

2.5 TH SCOPE configuration

1. Open the Windows start menu.
2. Select **All Programs → Softing → TH SCOPE**.
3. Then click **TH SCOPE configuration:**

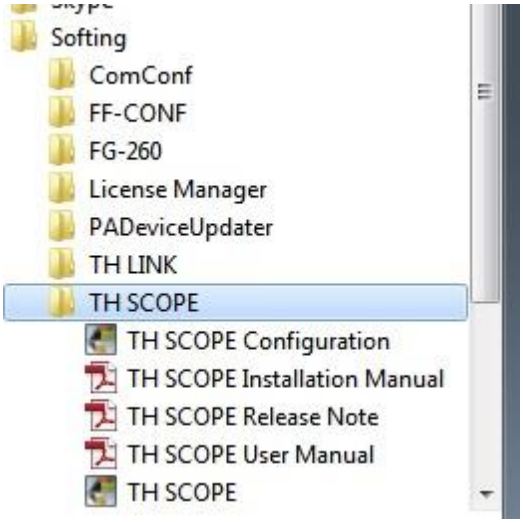


Figure 2: TH SCOPE configuration start menu

The default browser on your PC opens with the configuration interface of TH SCOPE.

2.5.1 Login

1. Click **Language** and select **English** to get the user interface with English texts.
2. Click into the login field.
3. Enter the password. Default password is **THSCOPE_Admin**.
4. Then click 

.

Note

We recommend changing the password after login (see User administration 14).

Note

Log out after having changed the settings. Otherwise you will have to wait approximately 10 minutes to reopen this page after closing the browser.

2.5.2 TH LINK detection

The TH LINK detection can be done automatically or manually:

1. Automatically means that the TH SCOPE detects the TH LINKs via multicast packets. If the detection via multicast packets is permitted in your network, no further settings are required.
2. Manually means that the TH SCOPE detects the TH LINKs via unicast packets. For the manually detection the following is necessary:
   - Enter the IP address for each TH LINK and click **[Add]** (see figure below).

Note

Settings are automatically saved.

Note

In the TH SCOPE navigation tree all TH LINKs are displayed, to which a connection can be established.

If less TH LINKS are displayed in the navigation tree than are effectively configured, a corresponding message appears. In this case we recommend to validate your configuration and your network settings.

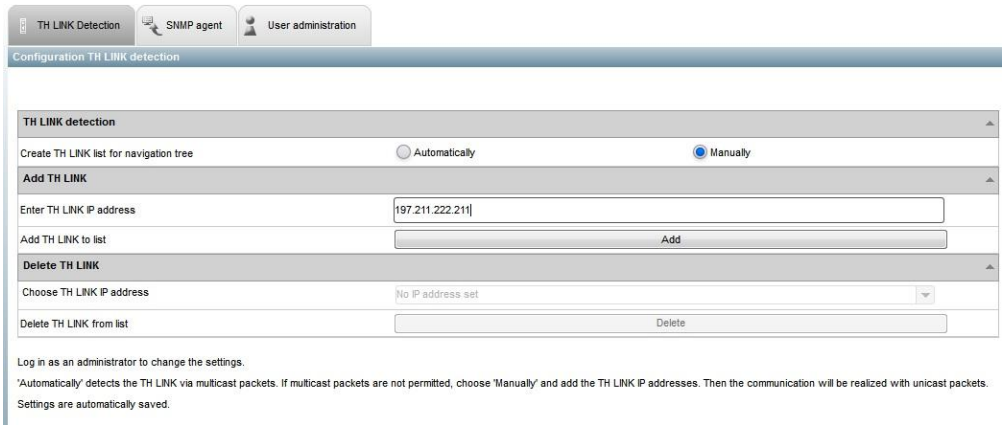


Figure 3: Manual TH LINK detection

2.5.3 SNMP agent

The TH SCOPE SNMP Agent provides the total status of all networks and the status of the individual network via SNMP. Therefore the information of the navigation tree and the network list is used. The SNMP Agent supports the SNMP version V1/2c and V3. For information about the specific configuration options click on the settings page on the question mark.

Note

The SNMP Client settings have to match with the SNMP Agent settings.

The Object Identifier (OID) of the SNMP MIB is: 1.3.6.1.4.1.29345. The following data is available:

OID	Name	Meaning
1.3.6.1.4.1.29345. 1.1.1	TotalNetworkState	Overall status of all networks
1.3.6.1.4.1.29345. 1.1.2	NumberAgents	Number of all TH LINKs detected
1.3.6.1.4.1.29345. 1.1.3	StatusTableAgents	List of all TH LINKs detected with additional information available (contains all following rows)
1.3.6.1.4.1.29345. 1.1.3.1.1	Index	Shows the row number of the table
1.3.6.1.4.1.29345. 1.1.3.1.2	State	Network status in a figure: 1: Ok 2: at least one station with diagnostics 3: at least one station is failed 4: no network activity, no station detected 5: TH LINK failed

OID	Name	Meaning
1.3.6.1.4.1.29345. 1.1.3.1.3	StateDescription	network status as text description (matches with the icon tool tip of the TH LINK icon)
1.3.6.1.4.1.29345. 1.1.3.1.4	Station	Host name of TH LINK
1.3.6.1.4.1.29345. 1.1.3.1.5	SupportedProtocolType	protocol type supported by TH LINK
1.3.6.1.4.1.29345. 1.1.3.1.6	IPAddress	TH LINK IP address of the automation network
1.3.6.1.4.1.29345. 1.1.3.1.7	Tag	TH LINK tag name
1.3.6.1.4.1.29345. 1.1.3.1.8	FWVersion	TH LINK firmware version

The following figure shows the MIB structure.

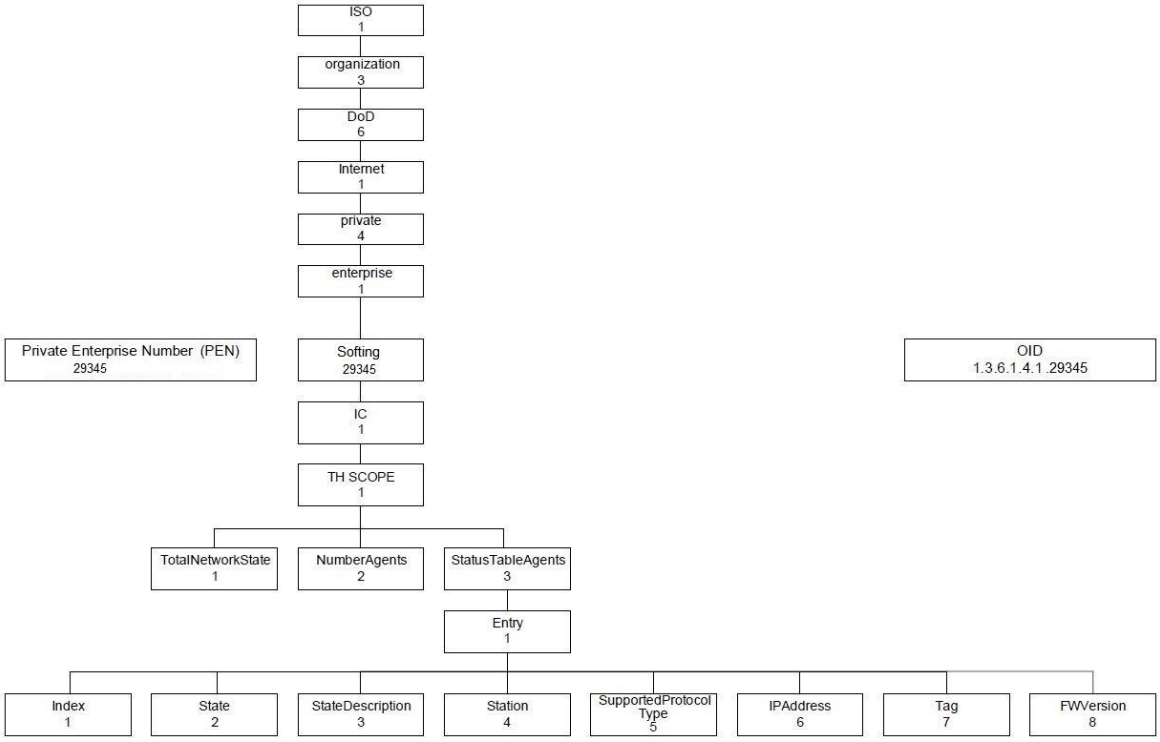


Figure 4: TH SCOPE MIB structure

2.5.4 User administration

Change the default password. Proceed as follows:

1. Log in as administror (refer to Login 11).
2. Click on **Settings** and then on **User administration**.
3. Enter the old password.
4. Select a new password and confirm it by re-entering.
5. Finally click **Change password**.

2.6 Open TH SCOPE

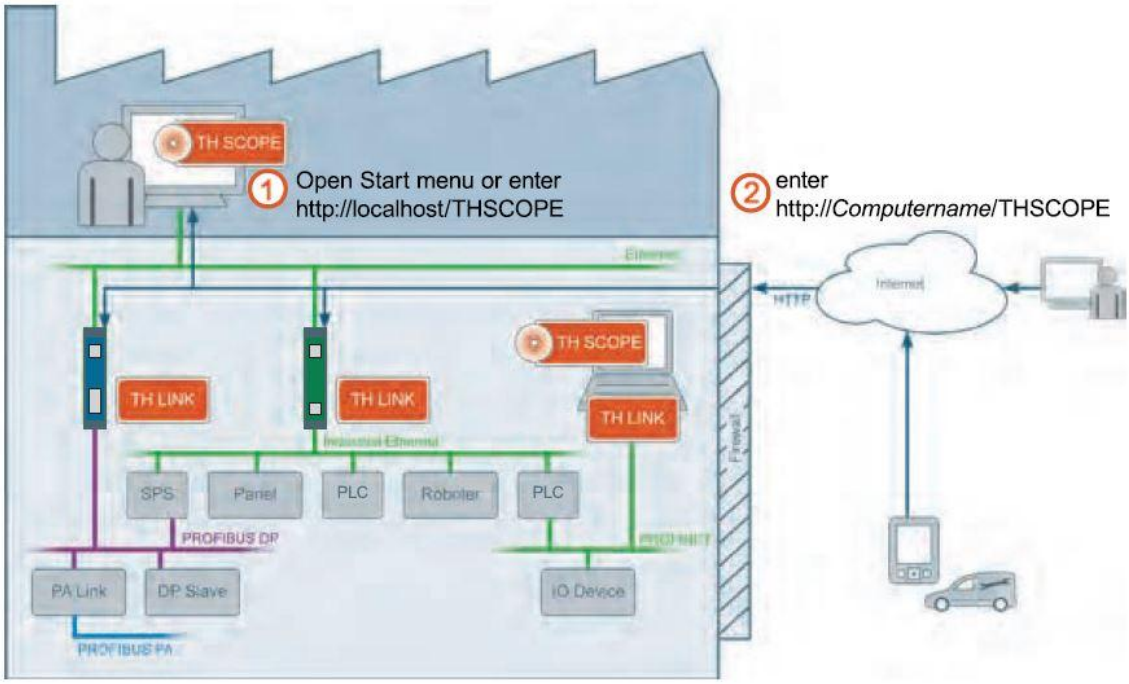


Figure 5: Open TH SCOPE

The application allows the following two access possibilities:

- Open TH SCOPE from the local PC
- Open TH SCOPE from a remote PC

① Open TH SCOPE from the local PC

1. Open the Windows start menu.
2. Select **All Programs → Softing → TH SCOPE**.
3. Then click **TH SCOPE configuration:**

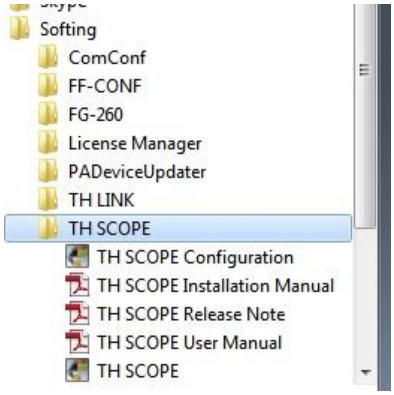


Figure 6: TH SCOPE configuration start menu

The default browser on your PC opens with the configuration interface of TH SCOPE:

Note

Refer to Port conflict by using two or more webservers at the same time 15 if you have a second web server installed on your PC.

② Open TH SCOPE from a remote PC

Enter the following URL into the address bar of your browser:

http://<Computer name>/THSCOPE

<computer name> is the computer name or IP address of the PC on which the TH SCOPE is installed.

Note

Refer to Port conflict by using two or more webservers at the same time 15 if you have a second web server installed on your PC.

2.6.1 Port conflict by using two or more web servers at the same time

Per default TH SCOPE is accessible from any PC. To display the TH SCOPE web page, the IIS webserver (Microsoft Internet Information Services, see TH SCOPE Installation Manual Section "System requirements") is requested via HTTP. By default, this request is submitted via port 80.

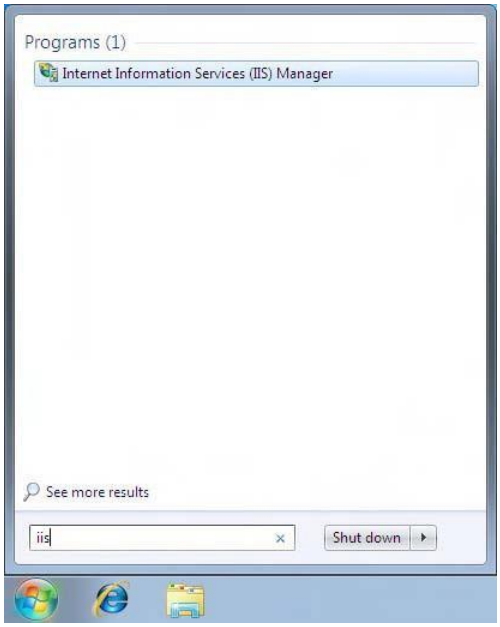
Several web servers could be installed on one PC at the same time. But only one of them can communicate via port 80.

2.6.1.1 Modify HTTP port (Windows 7)

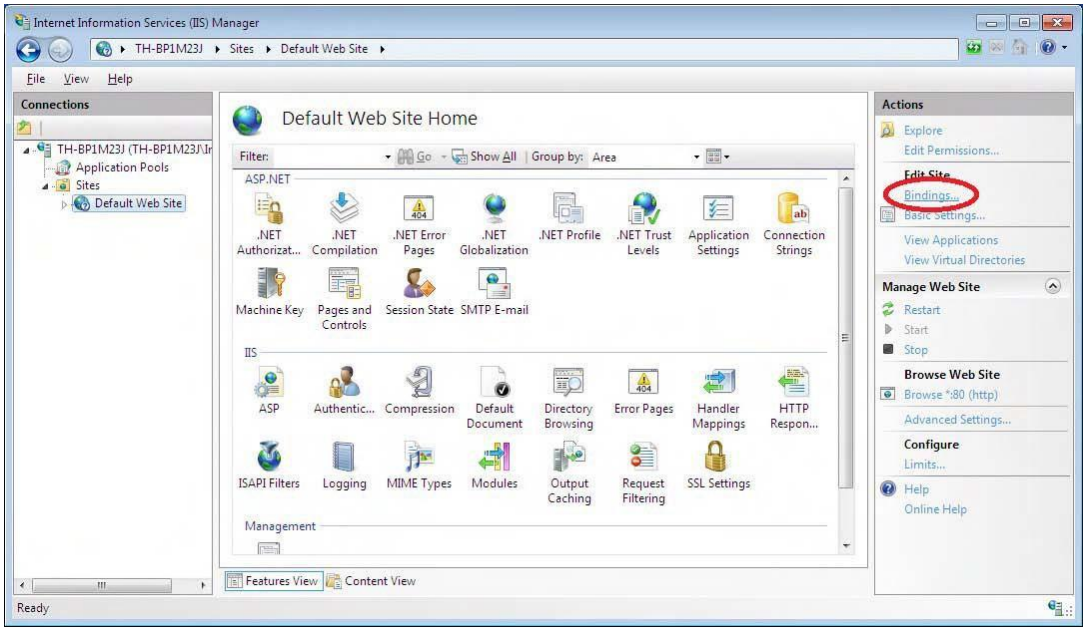
You can modify the HTTP port for the TH SCOPE application or respectively for the IIS webserver manually. Proceed as follows:

1. Click **Start** and enter **IIS**.

2. Then select **Internet Information Services (IIS) Manager**:



3. Click on **Default Web Site** and then click on **Bindings**.



4. Select **http** and click on**[Edit]**.

5. Change port 80 for example to 8080 and click **[OK]**. Then close all windows.

Note

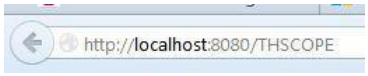
Instead of port 8080 you can also select another free port. Consult your IT department for more infromation.

Ports up to 1004 are managed by IANA.

2.6.1.2 Changes for TH SCOPE access

Local access

1. Enter **localhost:<port number>/THSCOPE** into the web browser.
Example: localhost:8080/THSCOPE. The port corresponds to the newly selected htttp port:



2. You always have to enter the selected port when you open the TH SCOPE in the web browser. The default links of the TH SCOPE cannot be used anymore.

Hint

Save the TH SCOPE request with the port as favorite.

Remote access

If you access remotely to the TH SCOPE application, enter the following URL into the address bar of your browser:

http://computer name:port number/THSCOPE

Computer name is the computer name or the IP address of that PC on which the TH SCOPE is installed and **Port** corresponds to the newly chosen HTTP port.

Example: 192.168.0.1:8080/THSCOPE

2.7 User interface

The graphical user interface comprises the following three areas:

1 Functions 19

2 Navigation 19

3 View area 19

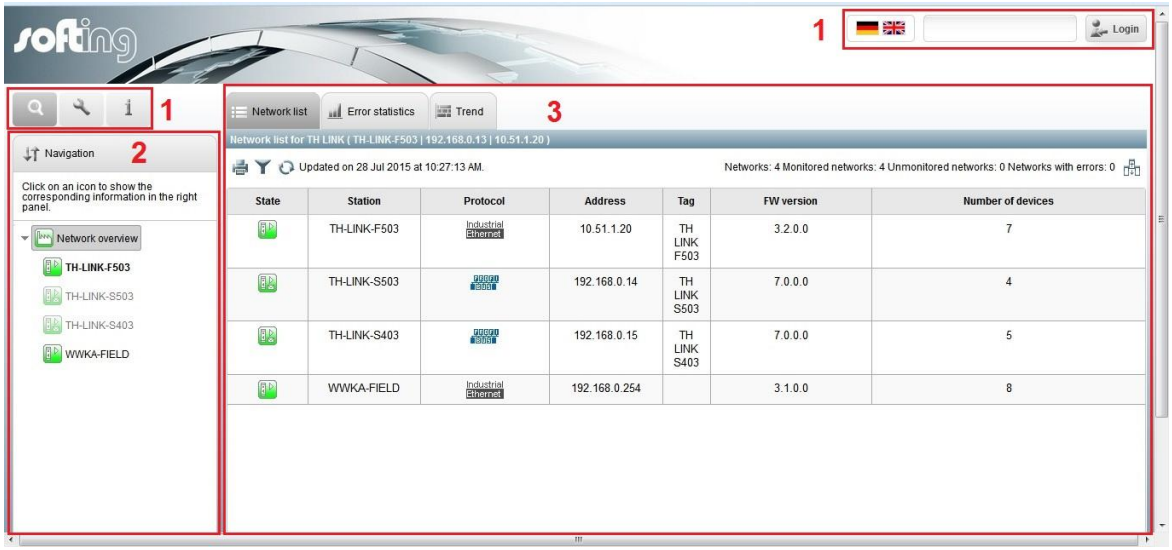


Figure 7: TH SCOPE start page

2.7.1 Functions

The following functions are available:


opens the network or device overview.


opens the settings page of the TH LINK in use.


allows to switch the language between German and English.


opens the product information of TH SCOPE and the TH LINK in use.

allows to log in/log off as administrator.

2.7.2 Navigation

Navigation is structured hierarchically. There are two levels:

- Network overview 25
- TH LINK 28

Each station is assigned an icon in the navigation tree. The state of the second level will always be transferred to the next higher level. This allows you to see at top level of the network overview if the network is faulty.

If a level in the navigation tree is clicked, the corresponding views with additional information are displayed in the view area.

2.7.3 View area

The veiw area displays the results of the current measurement. By clicking the tabs you can switch between different views.

2.7.4 Icon colors

The colors of the icons provide information about the network and station status:


green: ok


yellow: at least one station with diagnostics


red: at least one station is failed


gray: station without valid IP address (in Ethernet networks)

2.7.5 Filter

On certain pages in the view area (e.g., Network statistics) the information can be filtered Click the icon. A window opens allowing you to filter displayed data by state or address:

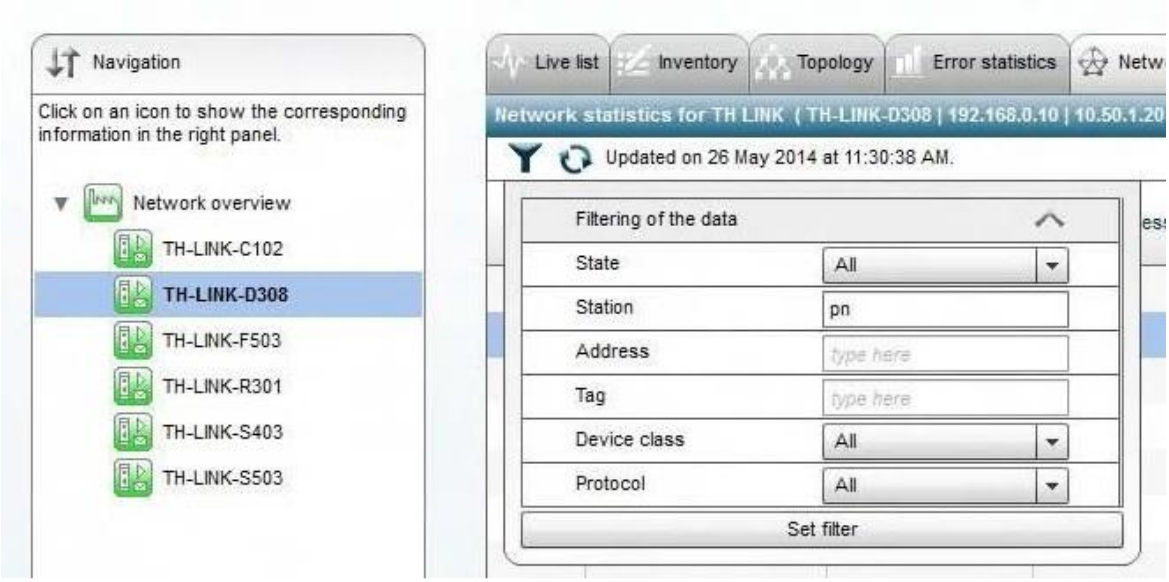


Figure 8: Filter displayed data

Depending on the view currently open, the following filters are available:

- State: Filters by the icon color.
- Participant: Filters by the station name.
- Address: Filters by the IP address specified.
- Tag: Filters by the tag specified.
- Device class: Filters by controller, device, module, sub-module, and network device.
- Controller-device relationship: After a controller is selected, the devices that communicate with it are displayed.
- Protocol: Filters by the selected network protocol.

Click on **[Set filter]** after your selection or entry to activate the selection. The filtered data are displayed and the icon in the view is marked by a check mark.

2.7.6 Update view

To update the page content click the refresh icon within the view or switch from one view to another and back.

2.7.7 Printing (TH SCOPE license)

To print the tables or topology click on the printer icon .

Note

When printing tables, the printer settings of the PC from which you access to the TH SCOPE are used.

The topology is exported into a PDF file that you can print afterwards.

2.7.8 Display or hide columns

Click the icon to display or hide table columns. A pop-up window is opened allowing you to hide or display table columns by activating/deactivating the respective check box:

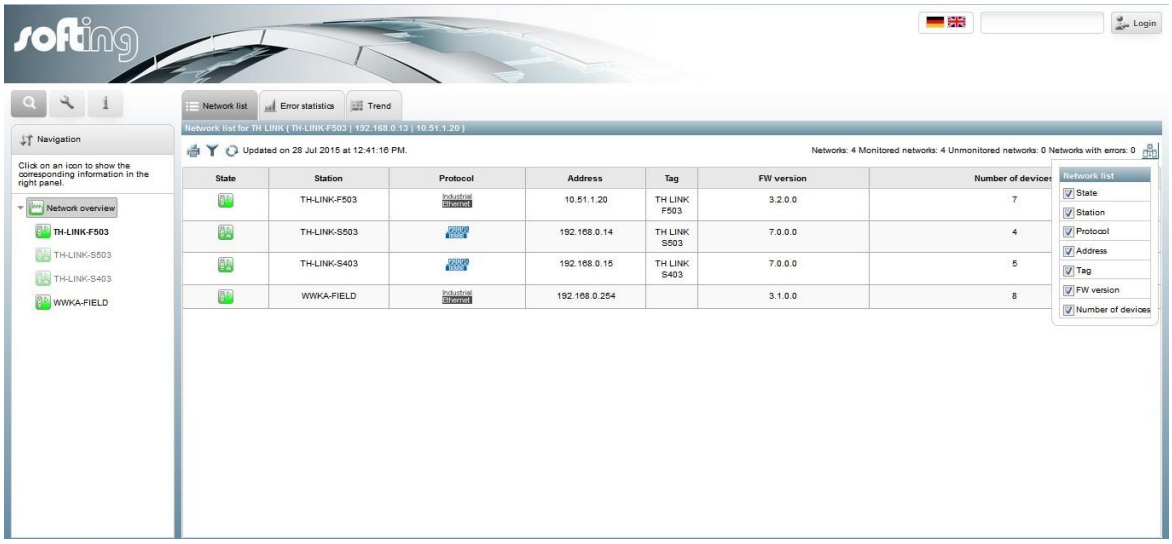


Figure 9: Display or hide table columns

2.7.9 Sorting

Click the corresponding column header in the table to sort table content. You can sort ascending or descending (click again). To sort consecutive columns press and hold the **Ctrl** key and select the desired columns. Not all columns can be sorted.

2.7.10 Tooltipps

All station icons have tool tips. Move the mouse over the icon to read the tool tip.

2.8 Close TH SCOPE

Close TH SCOPE by closing the browser window or the web browser.

3 Working with TH SCOPE

3.1 Open TH SCOPE periodically

You can open the TH SCOPE website periodically and learn about the state of your networks (refer to Open TH SCOPE 14).

3.2 E-mail alert

Depending on the TH LINK alert settings you will be informed by e-mail if stations have diagnostics, if they fail or if the network is running again. In the e-mail you will find information about the faulty network, which contains the TH LINK and a direct link to the browser page of the TH LINK. To change the alert settings of the respective TH LINK, you have to log in as administrator (refer to User roles 9). Then click **Settings** and confogure the alert settings. A Th LINK with alert activated is indicated by a small envelope symbol in the TH LINK icon  . Failure monitoring for uncoupled devices (e.g. robots) can be disabled in the view **Inventory** (refer to Enable/disable failure monitoring 33).

3.3 Integration into external application

Integration into OPC

The TH SCOPE OPC Server (OPC DA) is part of TH SCOPE

The TH SCOPE OPC Server provides the network information, that are displayed on the TH SCOPE website (station state, error statistics, bus statistics and network statistics), as OPC objects.

Note

The station state is available as text and as a numeric character.

In the OPC address space the OPC tags have the name Status for text (corresponds the tool tips of the icons) and State for the numeric character.

The numeric characters have the following meanings:

1: Green icon	Station is running smoothly
2: Yellow icon	at least one station with diagnostic s
3: Red icon	station has failed
4: Gray icon	station without valid IP address (Ethernet networks)

Integration into SNMP

TH SCOPE includes a TH SCOPE SNMP Agent. It provides the total status of all networks and the status of the individual network via SNMP. For more information refer to SNMP Agent 12.

3.4 Data export and archiving

You can export all diagnostics information of a network (TH LINK) into a spreadsheet file for calculation and archiving purposes (refer to Export (TH SCOPE license) 39). For each view in the TH SCOPE (except reference comparison, trend and export) a worksheet in the file is created. Charts and graphics are not displayed in the file.

3.5 Reference comparison

The reference comparison enables you to check whether changes were made in your network structure (refer to Reference comparison (licensed version) 37). Save the state of your network at a specific time as reference state. At a later stage you can compare this with the current network state and print out the comparison result.t

4 Detect errors

Station has a red icon

Fault pattern:	Station is displayed with a red icon.
Error cause:	The station is failed..
Measure:	Check the station for damage to the wire, for correct mounting of the connectors/connections and for other defects.

Station has a yellow icon

Fault pattern:	Station is displayed with a yellow icon.
Error cause:	The station has a diagnostic.
Measure:	Check the station and evaluate the manufacturer-specific diagnostics if necessary.

Permanent state change of a station

Fault pattern:	Permanent state change of a station between failure and ok.
Possible error cause::	Loose connection at the connector or cable.

PROFINET/Industrial Ethernet: Module/Submodule is not the original Module/ Submodule

Fault pattern:	In the diagnostics list is displayed the diagnostic Substitute module/submodule with the tip Module/Submodule is not the original Module Submodule, but compatible.
Possible error cause:	The firmware of the device has been updated. This includes a new GSDML file, in which a new module/submodule is available. However, the project has not changed, so that the controller transfers the parameterization of the old firmware that was created with the old GSDML file to the device.

5 Use views

5.1 Network overview

5.1.1 Network list (also TH LINK)

The Network list gives you an overview about all networks. You can see all TH LINK sorted by IP address and you can find out by the icons what a network type it is. Furthermore you can see the firmware version and how many devices are located in the network. Network overview is highlighted and the tab **Network list** is selected:

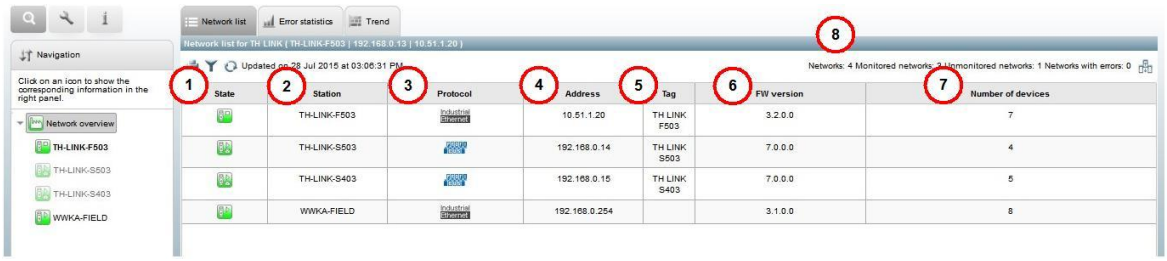


Figure 10: Network list

1 TH LINK state

2 Host name of TH LINK

3 Protocol type

4 IP address of TH LINK

5 Tag name of TH LINK

6 Firmware version of TH LINK

7 Number of all devices in the network

8 Overview fo all networks available, monitored or not monitored or faulty

5.1.2 Error statistics (also TH LINK)

Error statistics displays a list and a bar chart of all networks that are faulty. Faulty means networks, in which at least one station failed, has a diagnostics or at least one repeat/lost packet has been detected. Network overview is highlighted and the tab **Error statistics** is selected:

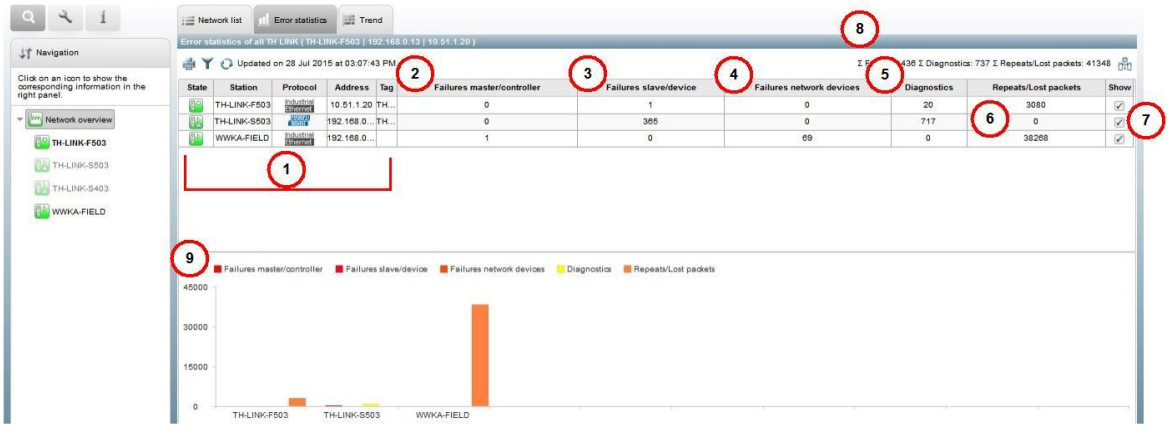


Figure 11: Error statistics

1 TH LINK data, see Network list (also TH LINK) 25

2 Number of all Master or Controller failures

3 Number of all Slave or Device failures

4 Number of all other network device failures

5 Number of all diagnostics

6 Number of repeats or lost packets

7 Show/hide in graphical view

8 Sum of all failures, diagnostics, repetitions/lost packets of all networks

9 Show/hide in chart view

Note

If this view is empty, all networks are running properly. That means since measurement start no error in the networks occurred.

Note

Lost packets are among: discarded packets (discarded caused by overload), error packets (defect packets) and unknown packets (not corresponding to the Ethernet standard).

5.1.3 Trend (licensed version)

This view displays graphically state changes of all networks are in a chronological sequence between one hour up to one month. The state change of the network icon is shown. Thus it is readily identifiable when and how long a faulty was existing in the network. Network overview is highlighted and the tab **Trend** is selected:

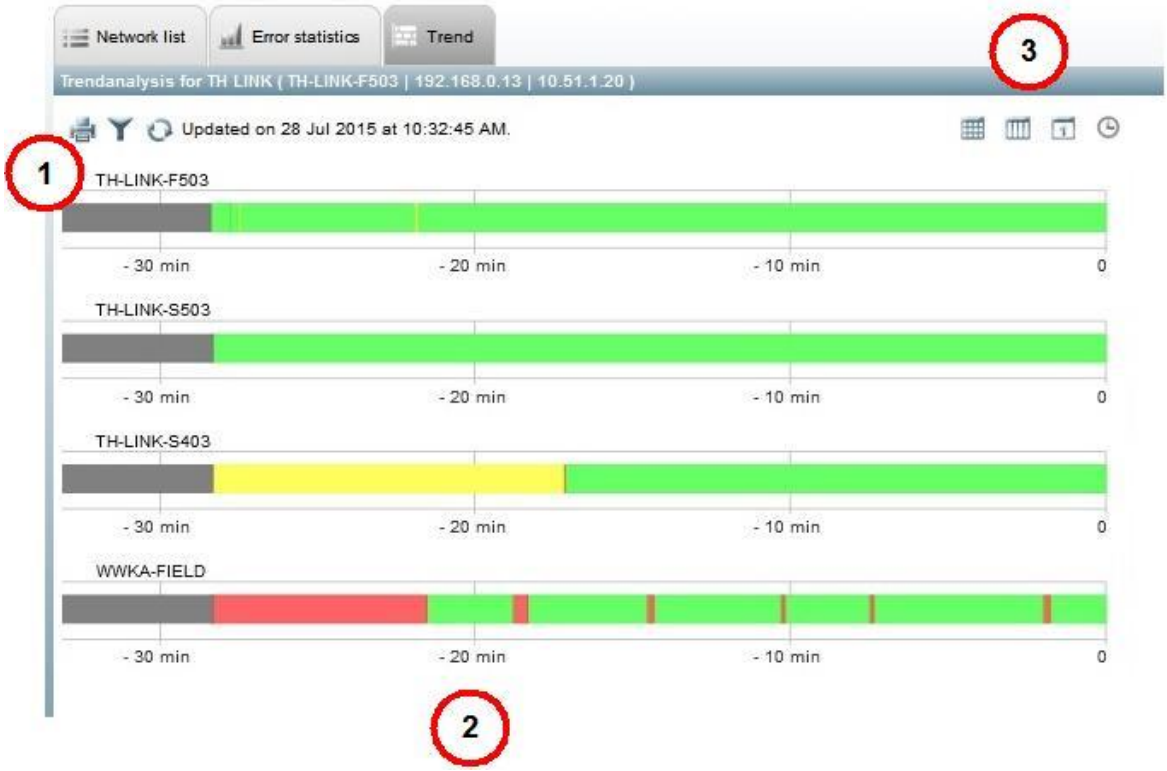


Figure 12: Trend (networks)

1 Host name of TH LINK

2 Time interval selected

3 Symbols to select the time interval (month, week, day, hour)

Legend: Green = OK

Yellow = Diagnostics

Red = Failure

Gray = No data available

Note

Up to 1000 state changes can be saved. If 1000 entries are reached, the oldest entry will be overwritten.

5.2 TH LINK

The following sections describe the TH LINK specific views (second navigation level). According to the TH LINK used and the license version, the number and names of the views are different.

5.2.1 Topology (TH LINK)

This view shows in form of a table which stations are connected with each other in the network.

Note

Stations supporting LLDP (Link Layer Discovery Protocol) or CDP (Cisco Discovery Protocol) are displayed, as well as terminal stations that are connected directly to a managed switch.

TH LINK is highlighted and the tab **Topology** is selected:

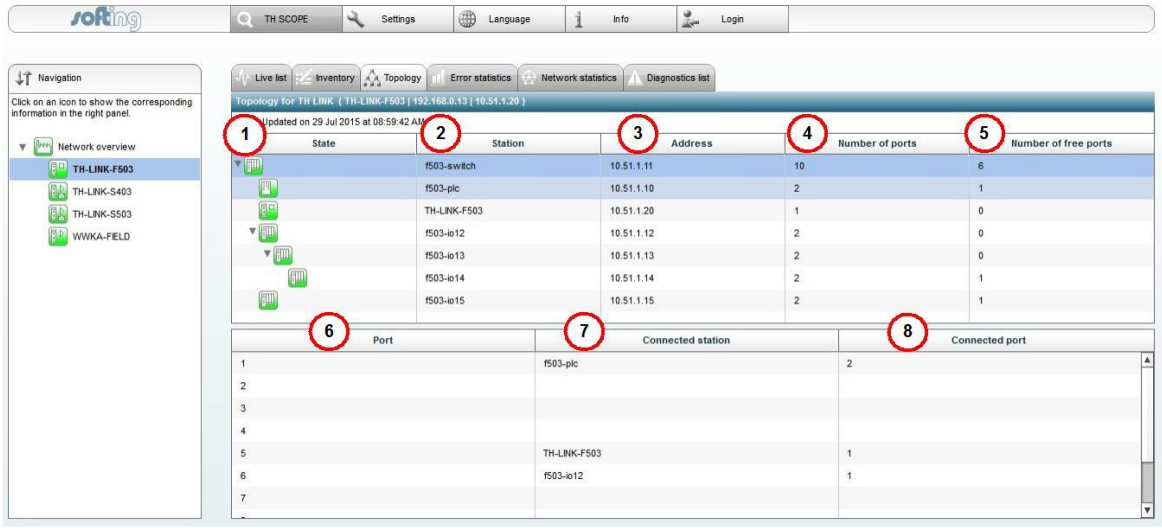


Figure 13: Topology – simplified TH LINK presentation

1 Type and state of the connected station. The tree view shows which station is connected to whom. By expanding/collapsing you can navigate.

2 Station name

3 IP address of the station

4 Total number of ports that can be used for linking the network.

5 Number of free ports.

6 Port of the station selected above.

7 Station that is connected to this port.

8 Port to which the linked station is connected to.

In the upper table click on a station to display in the lower table which port is connected to which device with its port.

5.2.2 Topology (TH SCOPE license)

This view shows in form of a table which stations are connected with each other in the network. It includes those whose peer cannot be determined. Stations without topology information can be hidden from the view. In addition, information on the status of the stations and their connection is displayed.

Note

Stations supporting LLDP (Link Layer Discovery Protocol) or CDP (Cisco Discovery Protocol) are displayed, as well as terminal stations that are connected directly to a managed switch.

Use the icons in the upper right corner to select the preferred view mode:

Change to graphic:

Change to table:

TH LINK is highlighted and the tab **Topology** is selected:

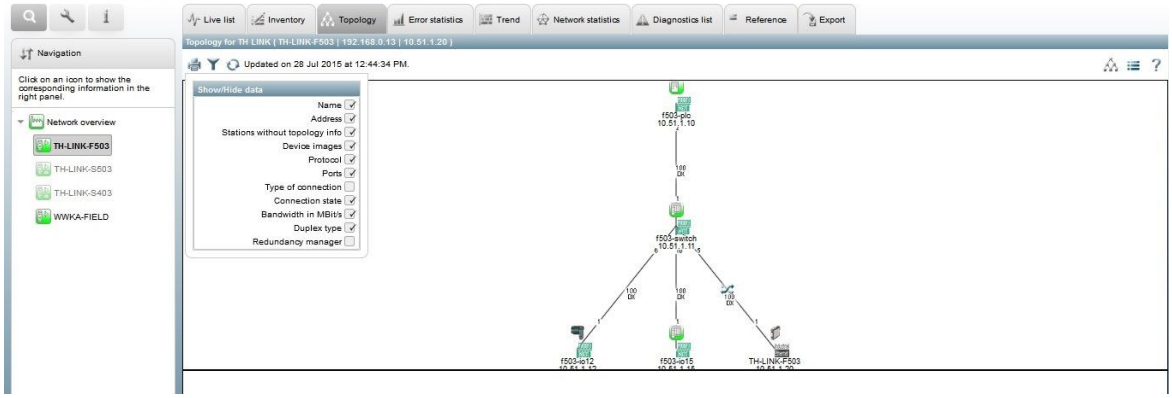


Figure 14: Graphical presentation of the stations connected with each other with device images displayed

The graphical topology representation offers the following information and options:

- You may change the zoom factor via the scroll wheel on your mouse.
- Station icons can be moved.
- Double-clicking on any station that station becomes the top node and all other stations will be located and aligned below. Double-click on the same station again to display the default topology view.
- For topology printing the following settings are available after click on the printer icon :

Paper size	The paper sizes A1, A2, A3, A4 and Letter are supported.
Orientation	The orientation can be chosen between portrait and landscape mode.
View	Total topology prints the whole network topology. Visible topology prints the displayed view.

Remark Possibility to add further information that is displayed in the print out. Maximum number of characters is 60.

- Information displayed in the graphical representation (Name, Address, Device images (refer to Display of device images in the topology 8), Protocol, Ports, Type of connection, Connection state, Bandwidth in MBit/s, Duplex type, Redundancy manager) and stations without topology information can be displayed or hidden as required. Click on the filter icon and select the desired data.
- Each line displays the following information:

  Connection type: As label and per line type.
  Copper: solid line.
  Wireless: Dotted line.
  OFC: Dashed line, displaying absorption in parentheses.
  For unknown line types a solid line without text is displayed.

  Connection state: (network quality)
  Lost packages: Connection line is orange Line disconnection: Connection line is red.

  Swapped ports are identified by this icon .

  Bandwidth: The bandwidth is shown in MBit/s.

  Duplex type: The duplex type is displayed as a line label: HX - half-duplex, DX - full duplex

  Redundancy: The redundancy manager is indicated by a R on the station icon..

After clicking on this icon the topology information is shown in tabular form. By sorting the columns, you may for example identify the connections with the highest utilization lines by a single click:

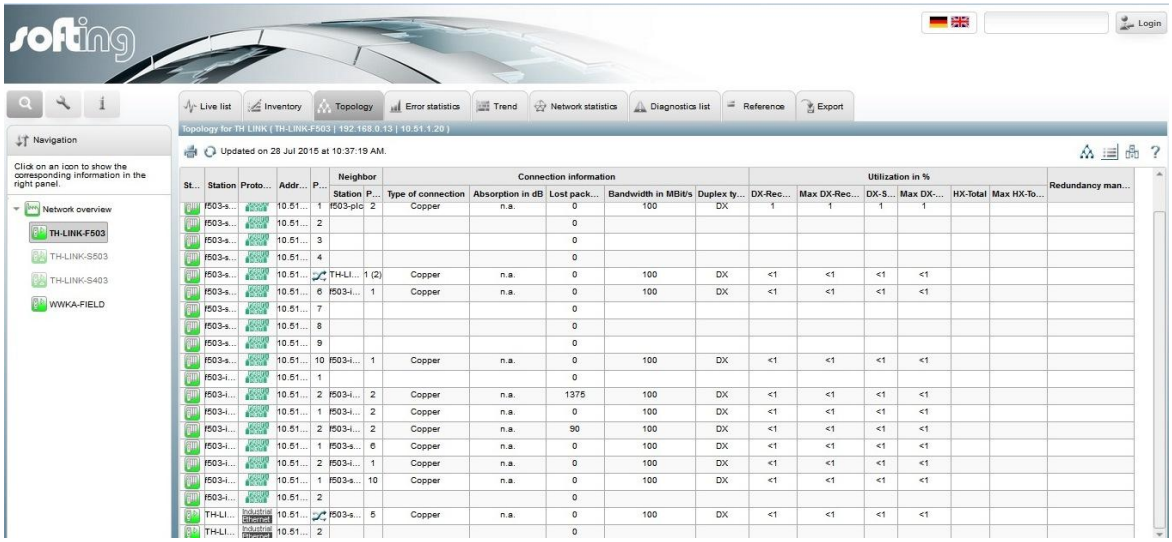


Figure 15: Topology – tabular representation

Table columns can be either hidden or displayed and sorted.

The utilization in % is calculated from the following factors:

- negotiated bandwidth,
- Duplex type
- transmitted data in bytes.

These values are read approximately 2 to 3 times per minute from the devices.

The utilization results from the difference of the transmitted bytes and the time difference between the readout times and is related to the negotiated bandwidth per duplex type. The maximum utilization value is stored and compared to the next new calculated value. If a new value is higher than the one before, this value is the new maximum value.

5.2.3 Live List (also TH LINK)

Live List displays all stations corresponding to their address. The header row and the first column give the address of the station. Icons and tag or station name of the stations are displayed within the cell. If no name has been configured, the address is displayed. TH LINK is highlighted and the tab **Live List** is selected:

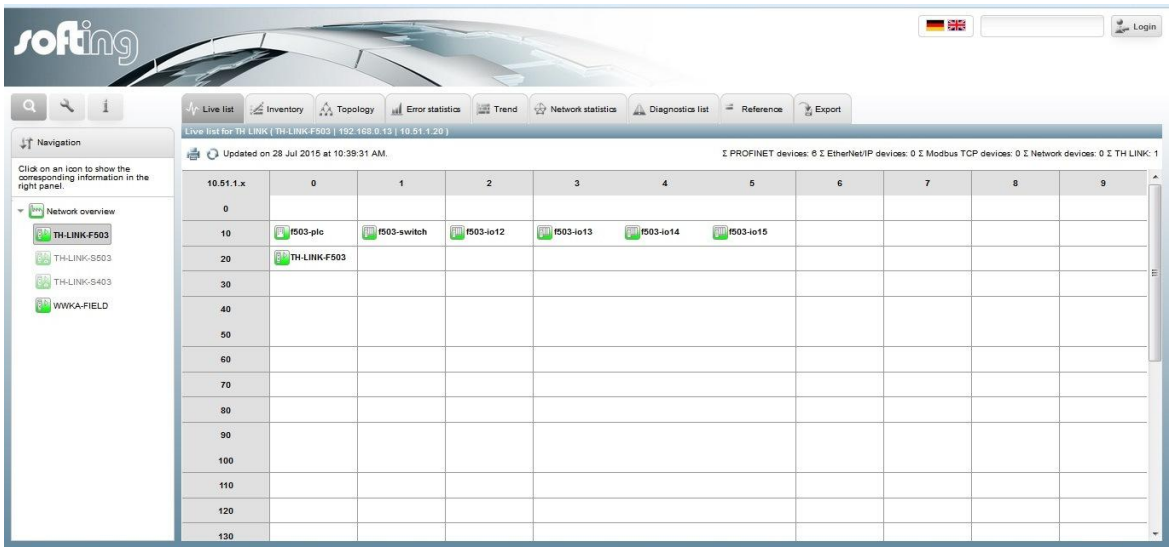


Figure 16: Live List

Note

Top left the station IP address range is displayed.

If different address ranges have been specified in the settings for the measurement, then the Live List display corresponds to these ranges configured.

Note

Top right the number of PROFINET, Ethernet/IP or Modbus TCP devices (according to the used TH LINK), other network devices and TH LINK is displayed.

Other network devices could be for example printer or switches. The state of these devices can be either ok or failed.

5.2.4 Inventory (also TH LINK)

Inventory displays all network stations, their modules, submodules and the TH LINK itself. The Inventory view for Industrial Ethernet networks appears as follows. TH LINK is highlighted and the tab **Inventory** is selected:

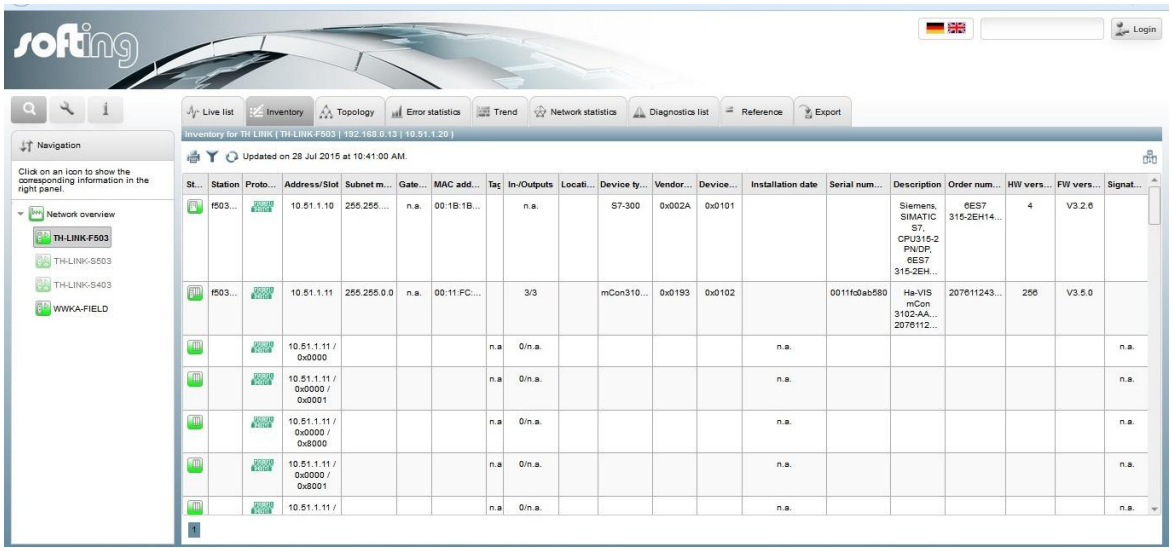


Figure 17: Inventory for Industrial Ethernet networks

Note

If for some devices several cells are empty, this is because the information is not stored in the device and thus cannot be read.

The table contains the following columns which can be filtered or shown/hidden selectively:

Column	Content	Note
Failure monitoring	Checkbox	see explanation below table
State	Icon	Station state and type
Station	Station name	
Protocol	Protocol type icon	
Address/Slot	IP address of the station	for modules additionally the slot is displayed
Subnet Mask	Station subnet mask	
Gateway	Station default gateway	
MAC Address	Station MAC address	
Tag	Tag, if set	

Column	Content	Note
In-/Out bytes	In-/Out bytes	Value for module displays sum of in-/out bytes of all submodules; value for device displays sum of in-/out bytes of all modules
Location Device type Device ID Manufacturer Installation date Serial number Description	Additional station information	I&M data is to be managed by the user (e.g. via device web server)
Order Number	Station order number	Is evaluated during connection establishment (assigned by manufacturer)
HW version FW version	Hardware or firmware version of the station	assigned by manufacturer

Enable/disable failure monitoring

The column **Failure monitoring** is only available for administrators. By default all cells are activated. Individual cells can be deactivated only for PROFINET devices. To that end, click on the check box. No further storage operations are required.

If failure monitoring is disabled for a particular station, no further failures will be reported. That means a station failure will no longer trigger an e-mail alert or update the diagnostic list or error statistics. The station is displayed with a gray icon.

Failure monitoring status - whether enabled or disabled - does not change upon TH LINK reboot. Failure monitoring is a name-based process hence a station address change is irrelevant.

Note

If you restart the measurement, check boxes for all stations will be automatically reset.

5.2.5 Error statistics (also TH LINK)

In the Error statistics only stations are displayed, that are failed at least once, have a diagnostics or or had a lost packet (PROFINET/Industrial Ethernet). TH LINK is highlighted and the tab **Error statistics** is selected:

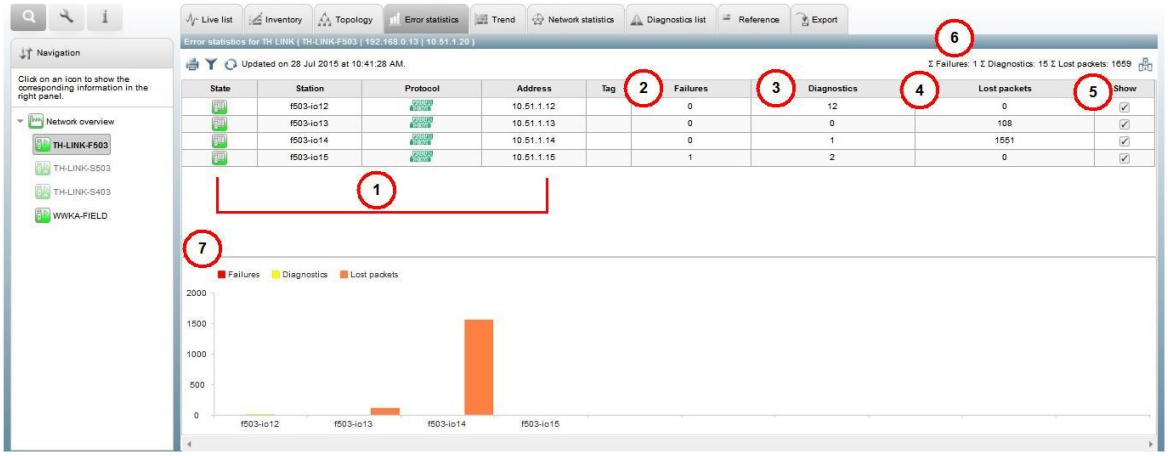


Figure 18: Error statistics

1 TH LINK data, see Network list (also TH LINK) 25

2 Number of failures

3 Number of all diagnostics

4 Lost packets

5 Show/hide in graphical view

6 Sum of all failures, diagnostics and repetitions/lost packets

7 Show/hide in chart view

Note

Lost packets (in Ethernet networks) are among: discarded packets (discarded caused by overload), error packets (defect packets) and unknown packets (not corresponding to the Ethernet standard).

5.2.6 Network statistics (also TH LINK, Industrial Ethernet only)

Network statistics displays all network stations (controller, devices and other networks). TH LINK is highlighted and the tab **Network statistics** is selected:

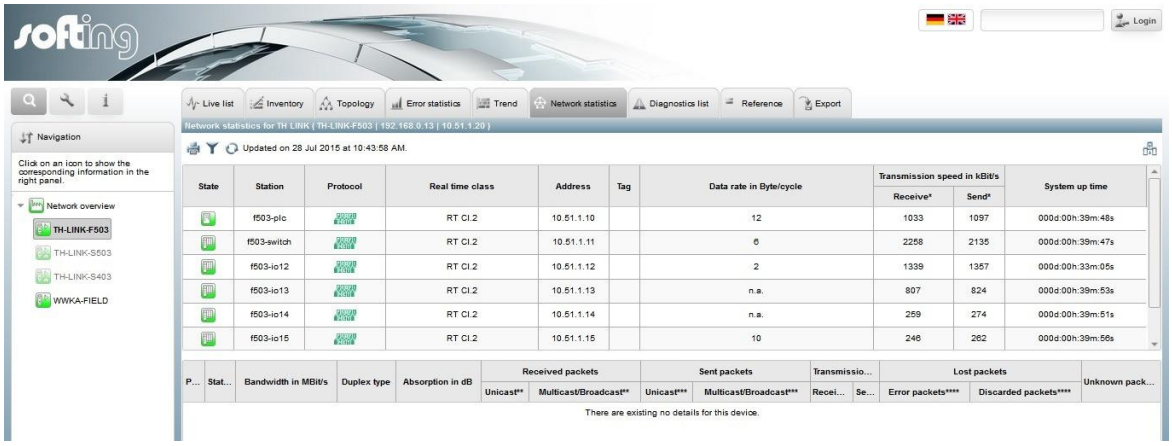


Figure 19: Network statistics

In the upper area the following information is displayed:

Column	Content	Note
Station state	Type, Status and Station name	
Protocol	Network type and protocol used by the device for data exchange with controller.	IRT is the fastest protocol, RT CL.UDP is the slowest protocol
Address	IP address of the station	
Tag	Station tag	
Data rate in Byte/cycle	Number of bytes that are transmitted per cycle	For device is valid: Sum of input/output bytes For controller is valid: Sum of input/ output bytes, that is given by application relation to the devices If a value for a device cannot be determined, it is also missing in controller data rate
Transmission rate in kBit/s Receive / Send	Shows current utilization of station at update time	
System up-time	Shows how long the station is running since the last reboot	

Click in the upper table on a station to display the port-specific properties of the station in the lower table:

Column	Content	Note
Port	Shows ports of the selected station	
Status	Shows whether a station is connected to this port (Up) or not (Down)	
Bandwidth	Maximally available bandwidth	Standard for PROFINET: 100 MBit/s
Duplex type	Full duplex (DX) or half-duplex (HX)	
Absorption	Absorption value in dB	for fibre optic cables only
Received packets	Number of packets received by station since reboot	Unicast: packets to a special receiver. Multicast/Broadcast: packets to a group or to all stations.
Sent packets	Number of packets sent by station since reboot	
Transmission rate in kBit/s Receive / Send	Shows current utilization for each port	
Lost packets	Number of lost packets per port	Error packets: defect packets. Discarded packets: packets discarded caused by overload
Unknown packets	Number of unknown packets per port	Unknown packets are not corresponding to the Ethernet standard

5.2.7 Diagnostics list (also TH LINK)

Diagnostics list displays all diagnostics of the selected network. TH LINK is highlighted and the tab **Diagnostics list** is selected:

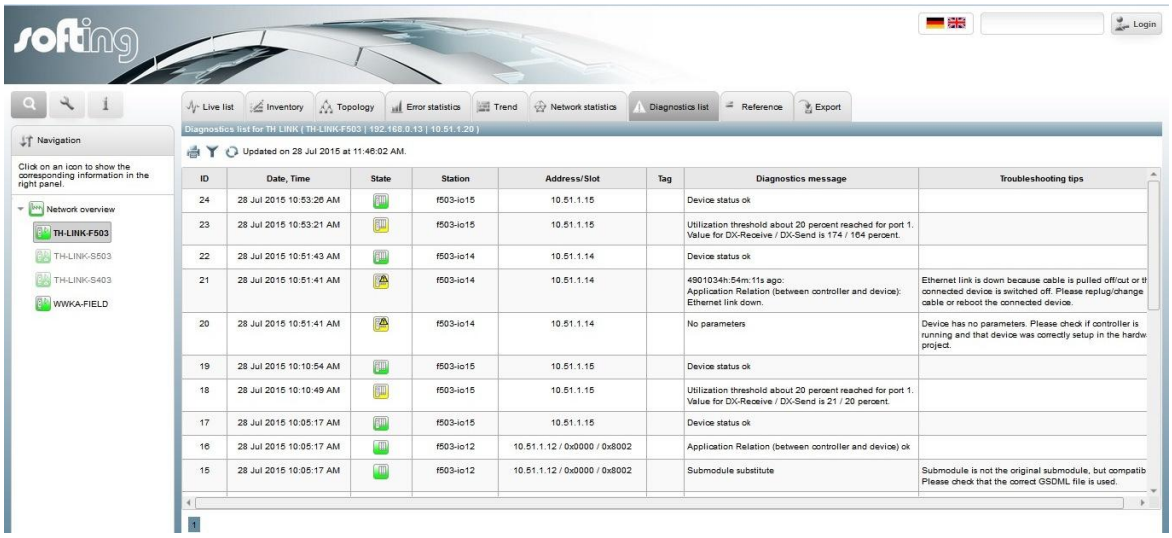


Figure 20: Diagnostics list

5.2.8 Reference comparison (licensed version)

The reference comparison compares the structure of the network

1. Define a reference state.
2. Select a previously saved reference state and compare it with the current network state.
3. View the result and print it if necessary.

1. Define reference state

a. Click **[Save]**.

b. Enter a file name to save the reference state.

2. Run comparison

a. Select a reference state.

b. Click **[Load]** and select the previously saved reference file.

c. Click **[OK]** to perform the comparison

3. Display comparison result

The result displays whether a deviation to the reference state has been detected. If deviations have been detected, they are displayed in tabular form grouped by **Detected stations and state**, **Error statistics**, **Topology** (Ethernet only) or **Network statistics** (Ethernet only) .

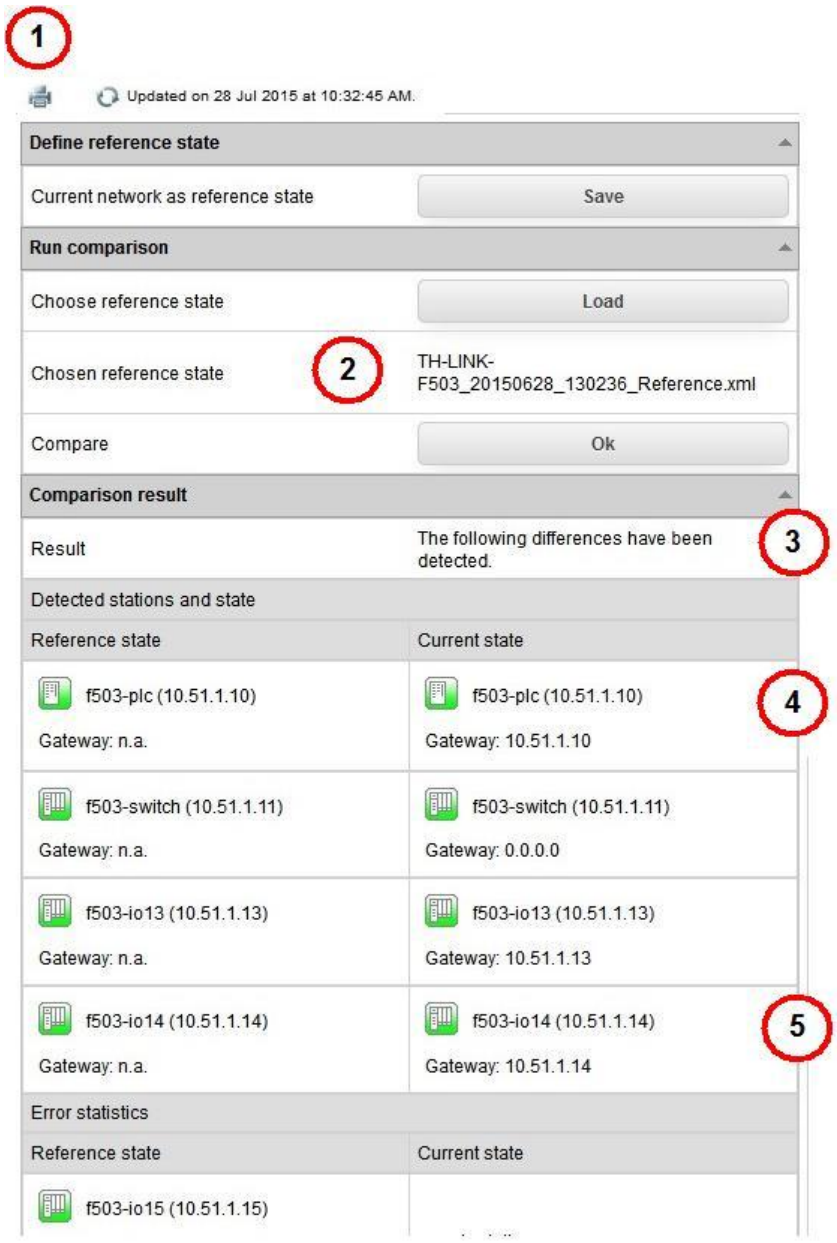


Figure 21: Completed reference comparison

1 Print reference comparison result.

2 Selected reference state.

3 Reference state and current state differ from each other. Differences are shown in the table below.

4 Error statistics show the increase of lost packets, failures or diagnostics.

5 Network statistics may show changes at the ports, e.g. if a cable is replugged.

5.2.9 Trend (licensed version)

This view displays the state changes of all stations in a chronological sequence. Thus it is readily identifiable when and how long a faulty was existing at a station. Maintenance cycles can be deduced from this information. TH LINK is highlighted and the tab **Trend** is selected:

Figure 22: Trend

1 Station name or tag

2 Symbols to select the time interval (month, week, day, hour)

3 Time interval selected

Legend: Green = OK

Yellow = Diagnostics

Red = Failure

Gray color gradient = station inactive or without valid IP address

Gray = No data available

Note

Up to 1000 state changes can be saved. If 1000 entries are reached, the oldest entry will be overwritten.

5.2.10 Export (TH SCOPE license)

Export of the data is used for archiving and further processing of the TH SCOPE diagnostics information. The data is exported into a spreadsheet file. To do so, click **[Export]** and save the file. TH LINK is highlighted and the tab **Export** is selected:

Figure 23: Export

For each view in the TH SCOPE (except reference comparison, trend and export) a worksheet in the file is created. Charts and graphics are not displayed in the file.

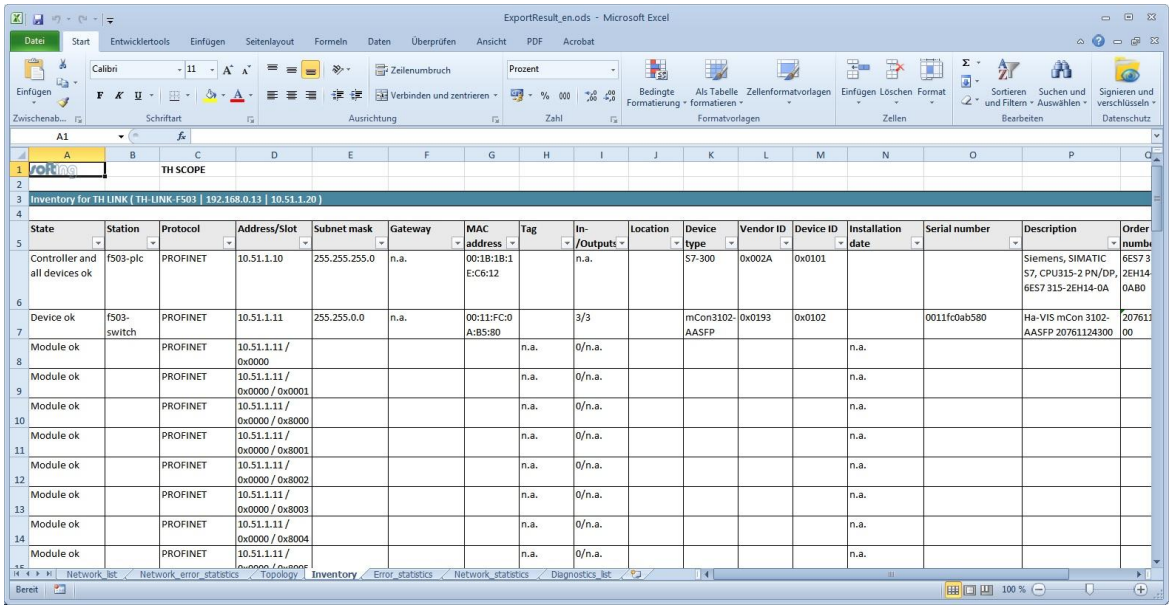


Figure 24: Example of a file

Note

The file column headers can be used to filter and sort.

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Related Documents

TH SCOPE

- Installation Manual

- Release Note

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