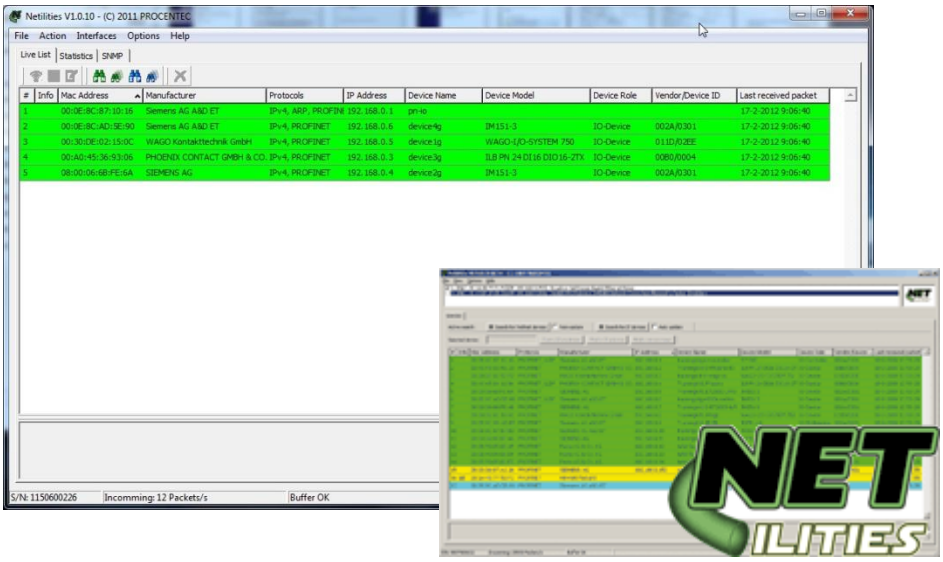
PROCENTEC



User Manual

Netilities 1.1.0

PROFINET-Analyzer

PROFINET analyzer with powerful statistics
Suitable for PROFINET-IO RT & IRT
Livelist
SNMP Information & Topology scan
Runs on XP, Vista and Windows 7 platforms

Version 0.1.2 – 29 February 2012

PROCENTEC

Safety Guidelines
This manual contains notices which you should observe to ensure your own personal safety, as well as to protect the product and connected equipment. These notices are highlighted in the manual by a warning sign and are marked as follows according to the level of danger:


Draws your attention to important information on handling the product, a particular part of the documentation or the correct functioning of the product.

Warranty
Warranty is void if you open the Netilities appdong.

Disclaimer of Liability
We have checked the contents of this manual as much as possible. Since deviations cannot be precluded entirely, we cannot guarantee full agreement. However, the content in this manual is reviewed regularly and necessary corrections will be included in subsequent editions. Suggestions for improvements are welcome.

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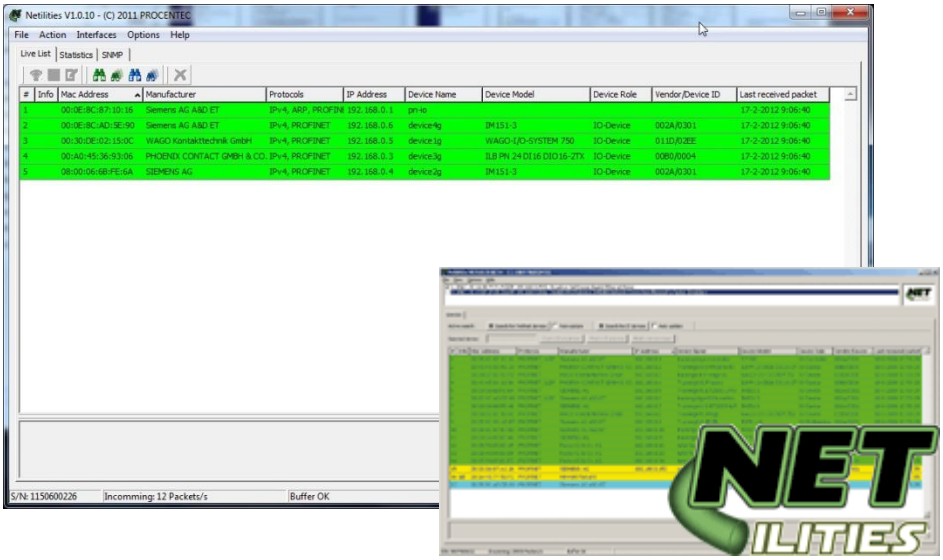

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Important Information

Purpose of the Manual
This user manual provides information how to work with Netilities.

Recycling and Disposal
The parts of the Netilities appdong can be recycled. For further information about environment-friendly recycling and the procedure for disposing of your old equipment, please contact:

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1 Product description

1.1 Introduction

Netilities is a compact and efficient tool to support the user with his PROFINET engineering and troubleshooting tasks. It can generate a live list of the PROFINET/Ethernet network and spot the devices which are in Data Exchange. Statistics provide an overview of the network condition. It utilizes the standard Ethernet/WLAN port on the PC or interfaces with a ProfiTap.

Info fields are displayed to inform the user on actual network problems, like: device missing, double device names, double IP addresses, etc. The Statistics provide an overview over the cycle times, corrupted telegrams, data size, etc.

Netilities is also used to set Device Names and IP addresses and export the detected devices to CSV. The LED test feature can identify the targeted PROFINET device. The best performance of Netilities is achieved when the laptop is directly connected to the mirror port of a switch which is installed directly behind the PLC or other controller.

The licensing and software storage is handled by a USB dongle. The dongle can be used on multiple PCs.

1.2 Product features

- ✓ Real time scan / Live List of the complete network
- ✓ Info panel for network problems (device missing, double addresses, etc.)
- ✓ Statistics (cycle times, corrupted telegrams, data size, etc.)
- ✓ Setting Device Names and IP numbers
- ✓ Topology scan based on SNMP and LLDP
- ✓ PROFINET LED test
- ✓ Suitable for other Ethernet systems

1.3 Application areas

- ❑ Troubleshooting & maintenance of PROFINET networks
- ❑ Commissioning of PROFINET networks
- ❑ Education

1.4 Detectable faults on PROFINET

- ✓ General communication faults
- ✓ Lost/missing device
- ✓ Wrong device name
- ✓ Double device names
- ✓ Double IP addresses

1.5 System requirements

In order to use Netilities and all sub programs, your computer system should include the hardware and software listed below. The software has been tested to work on Windows XP and Windows 7.
Minimum requirements:

- ❑ Microsoft Windows XP
- ❑ 600 MHz Intel Pentium III processor or equivalent
- ❑ 512 MB of RAM
- ❑ 1024x768 resolution display
- ❑ 1 free USB 2.0 high-speed interface port (for AppDong)
- ❑ 1 free USB 2.0 high-speed interface port (when using ProfiTap)
- ❑ 1 free 100Mbit Ethernet port (when connecting directly to a switch)
- ❑ 1 mouse or other pointing device

Recommended (differences from minimum):

- ❑ Dual core 2 GHz processor or equivalent
- ❑ 1024MB of RAM
- ❑ 1280 x 1024 resolution display or better

IMPORTANT NOTE:
The performance also depends on the size of the installation. The more devices in the installation, the more processing power is needed.

2 Software installation instructions

This chapter describes the installation for Netilities and the WinPcap drivers. It is assumed that you have a basic knowledge of Windows operating systems. All examples and dialogs are based on a US/UK based Windows installation and may differ slightly based on upgrades, updates and enhancements. Please use the screenshots in conjunction with the description in order to press the appropriate buttons and other user interface items.

2.1 Installation procedure

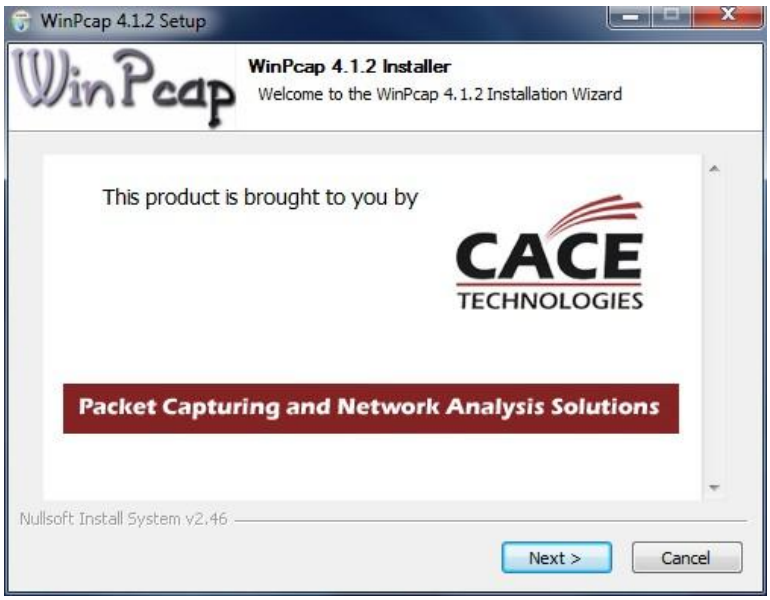
You can run Netilities directly from the USB stick without having to install it on your PC.

2.2 First use

When Netilities is run for the first time, it checks if the required libraries for WinPcap are installed. If these WinPcap libraries are not present the WinPcap installer will be launched.

2.3 Installing WinPcap Driver

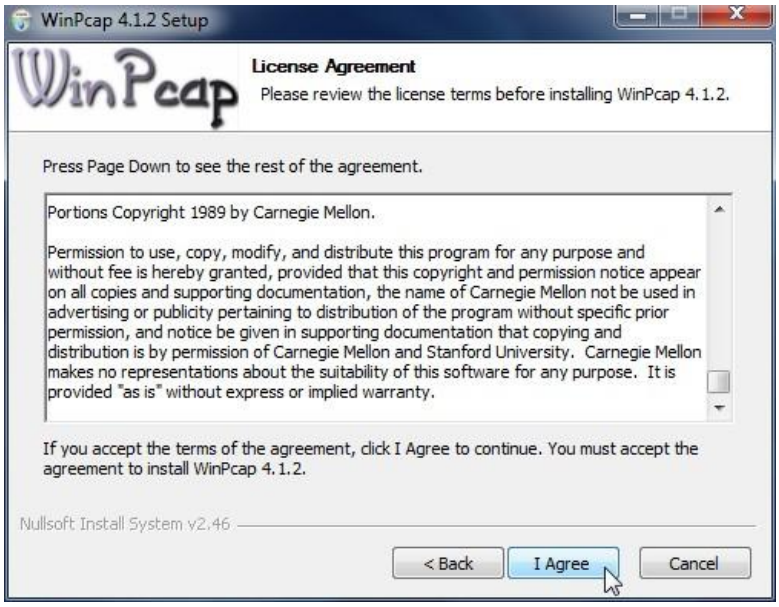
The installation of the WinPcap driver is either started by Netilities when it is launched for the first time or by starting it manually from the USB stick.



Click "**Next**" to proceed.

Click “Next” to proceed.

You have to accept the terms of the license agreement.



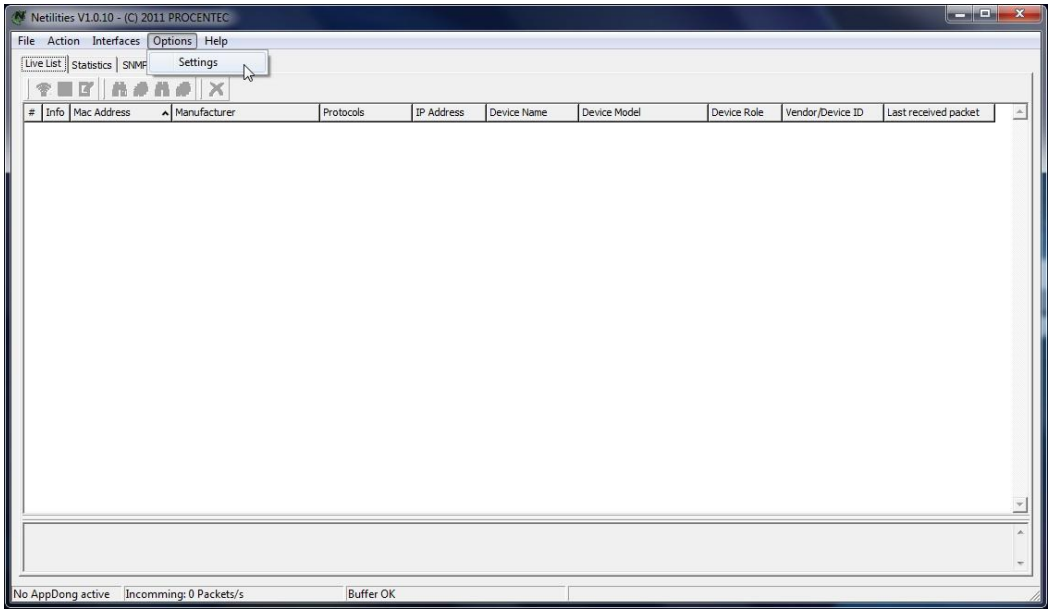
Click “Next” to proceed.

Select “Automatically start the WinPcap driver at boot time.”.
Click “Install” to proceed.

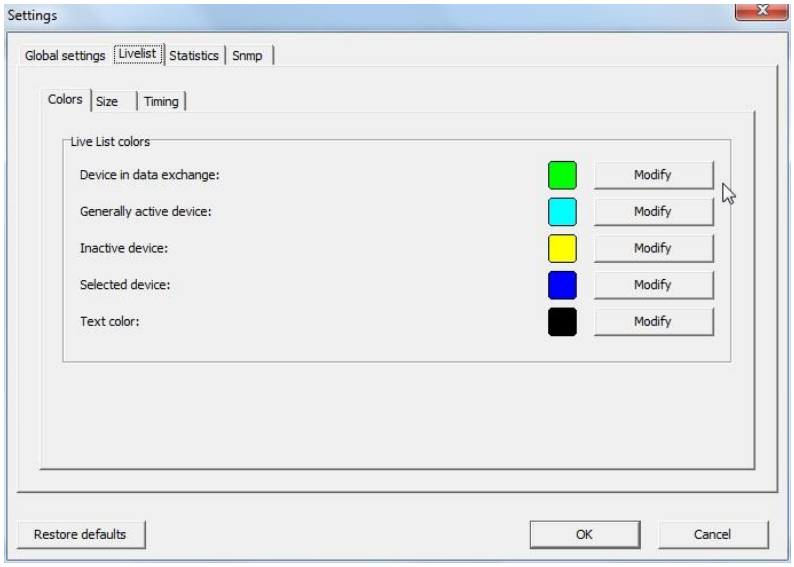
Click “Finish” to close the installer.

2.4 Setting colour preferences

The colours of both the Live List and the Statistics can easily be adjusted in the Options/Settings menu.



Click “Options” followed by “Settings” to proceed.



Click on “Livelist” and “Colors” to set the Live List colours. If you want to adjust the Statistics colours, click on “Statistics”.

2.5 Updates

It is the policy of PROCENTEC to release periodic updates. These updates will overwrite your previous version. If you want to keep the previous you can make a backup of it on the USB stick.

3 License system

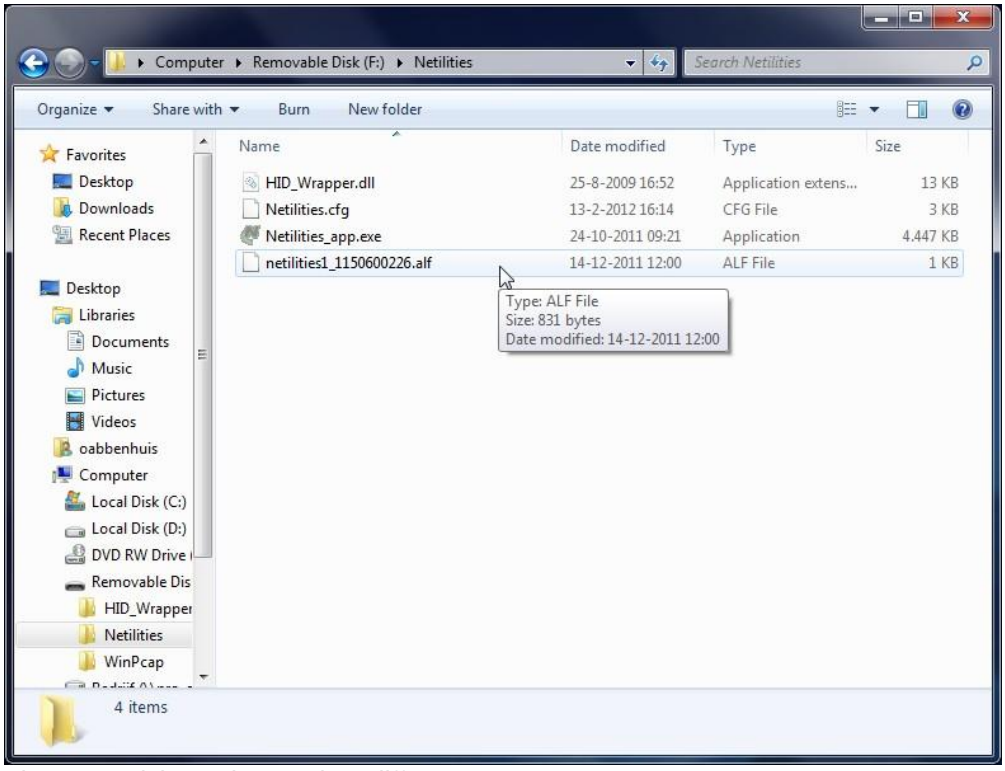
3.1 Introduction

For using Netilities you need the “appdong” USB stick, on which Netilities is supplied. The appdong also provides your license for Netilities.
You purchase a license for the following combination:

- Netilities (Live List) + Statistics + SNMP

3.2 Storage location of the license file

The license file for Netilities is stored in “\Netilities” directory of the USB stick.



The USB stick can be used on different PCs.

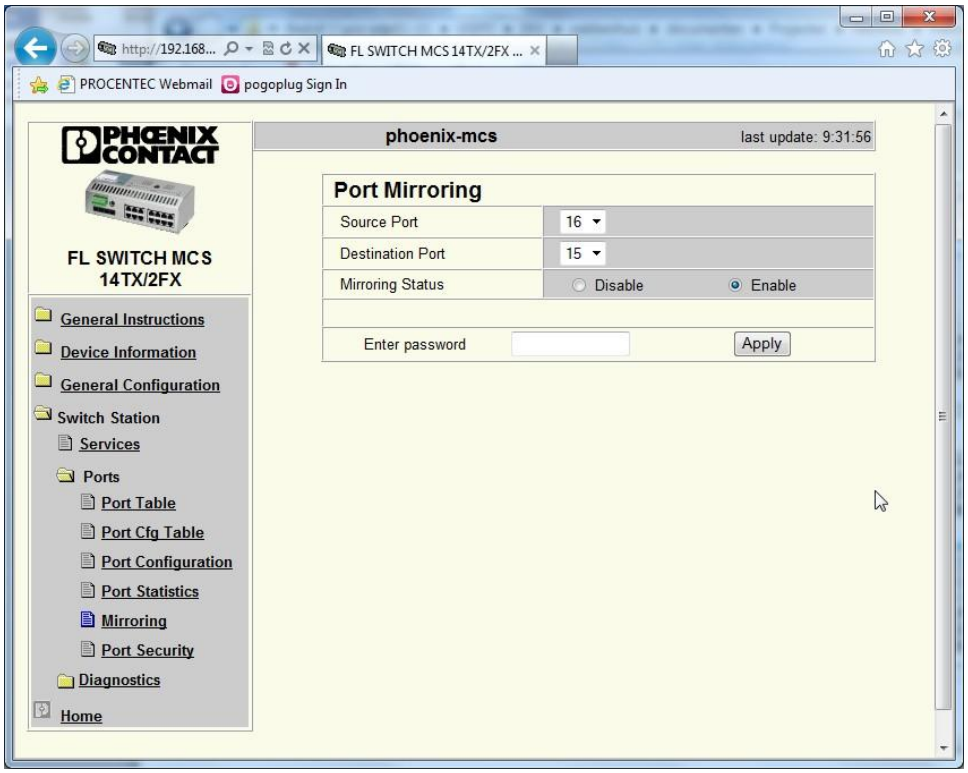
4 Quick start guide

4.1 Adding Netilities to the installation

Attach a network cable to the network port of your laptop/PC. Connect the other end of the network cable to the mirror port on the PROFINET switch. The LED of that port should be ON indicating a working link.

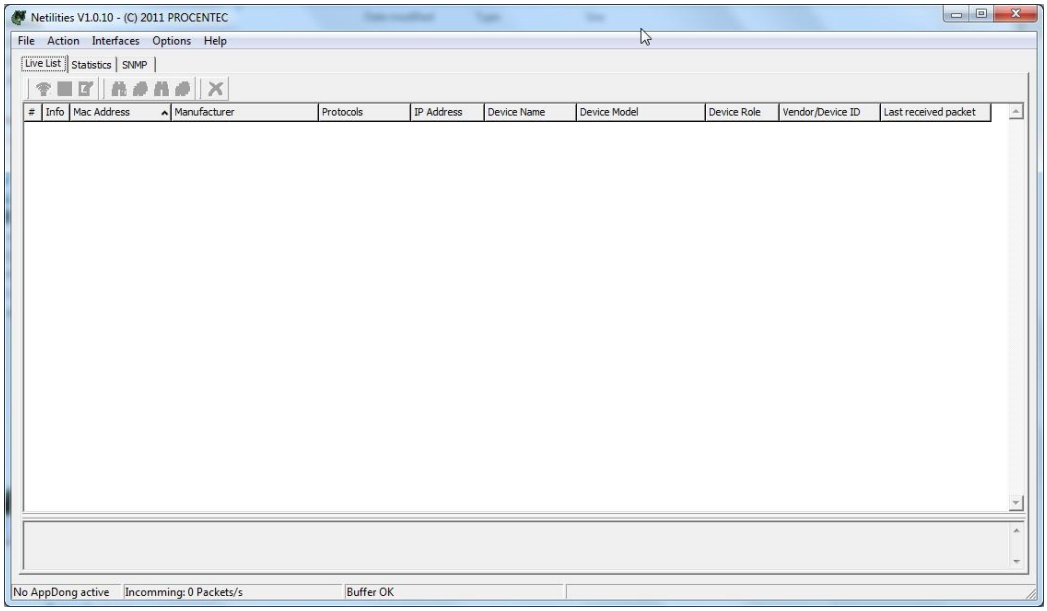
4.2 Configuring the PROFINET Switch

In order for Netilities to receive network data, a free switch port should be configured to mirror a port. For best results the port on which the PNIO-Controller is attached should be mirrored to the port your computer is connected to.

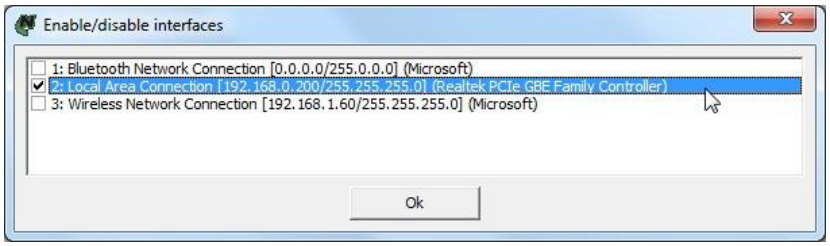


4.3 Starting Netilities

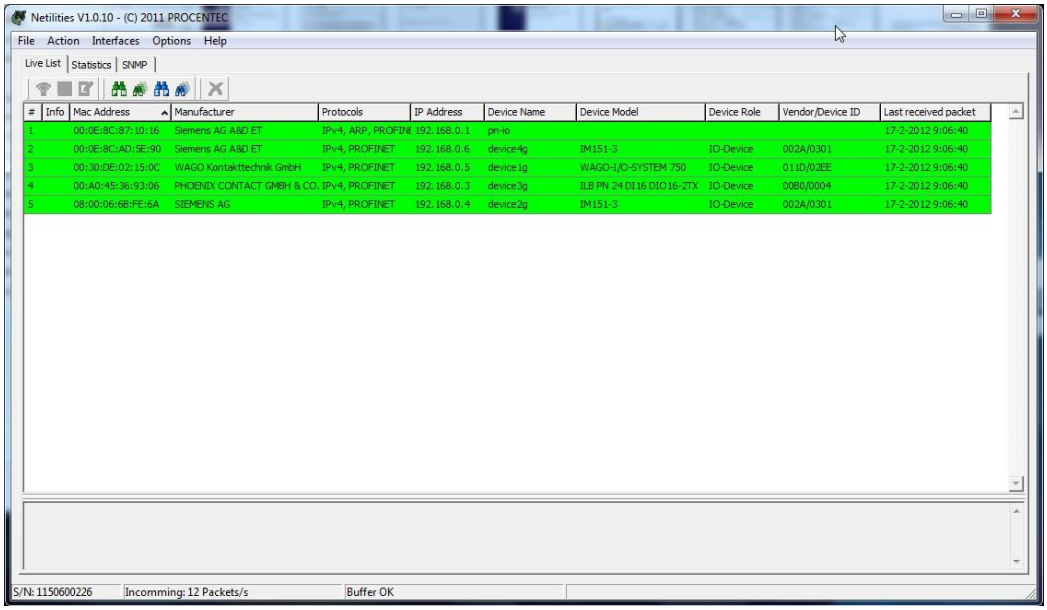
After starting up the Netilities software, the screen as in <referentie Fig 49> should appear.



Click on “Interfaces” and “Enable/disable interfaces” to start the software.



After an interface is enabled, the Live List should be visible.



4.4 Analyzer

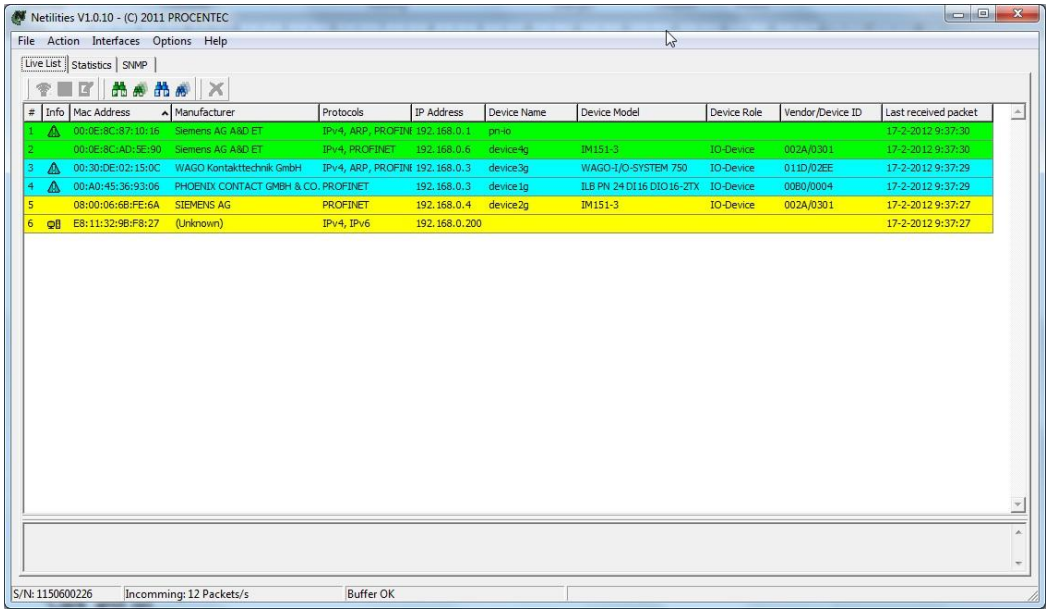
Netilities itself is an analyzer to display a Live List and to view statistics. A quick overview of this is given in the next sections.

4.4.1 Live List

"Colours make it easy…"

The Live List is a table which continuously lists all the available devices. It is directly visible which devices are active, in data exchange and which devices are inactive. With different background colours, the status of the devices is displayed.

- Yellow: inactive device
- Light blue: Generally active device
- Green: Device in data exchange



4.4.2 Statistics

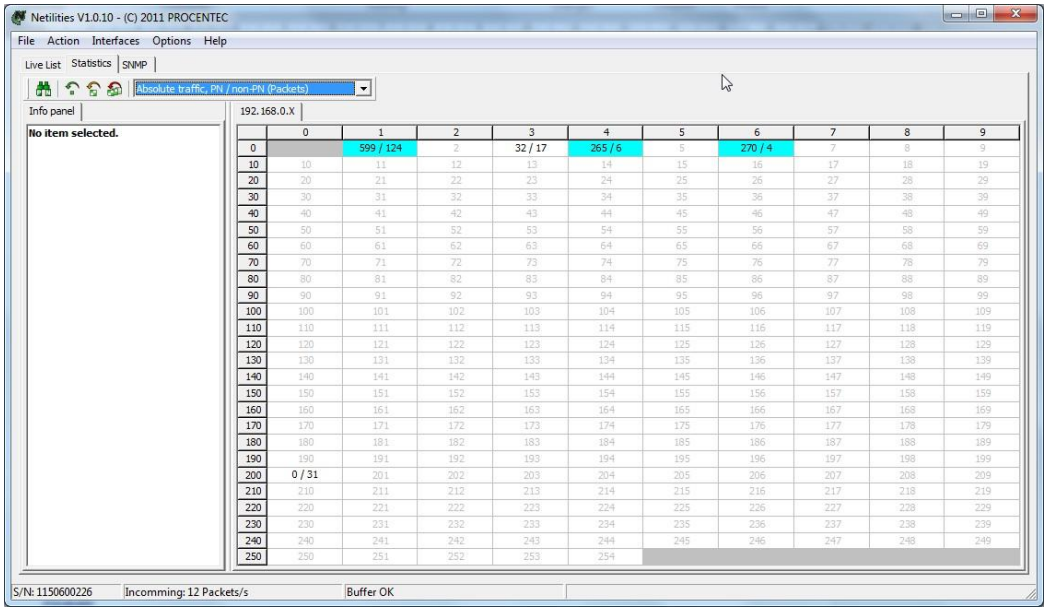
"Click and go…."

The statistics matrix is the most powerful feature of the analyzer. This field can really indicate what the condition of an installation is. It displays the important information that a user, especially a maintenance technician is really interested in:

- Current cycle time
- Minimum cycle time
- Maximum cycle time
- Transfer status error count
- Alarms (device/controller)
- Absolute traffic (PROFINET/Non PROFINET)
- Relative traffic (PROFINET/Non PROFINET)

Because of this feature, the user does not have to inspect messages or do difficult operations to ensure the quality of the installation.

- Light blue: Changed statistic
- Yellow: Device is not active

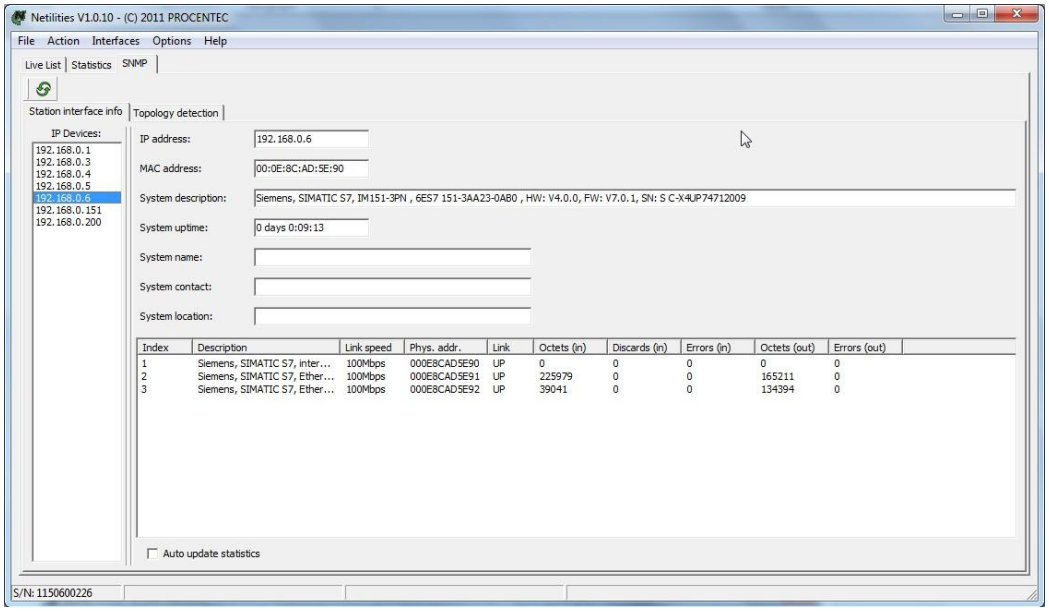


If the statistics do NOT show deviations, the installation is on the 1st degree OK!!!

4.4.3 SNMP

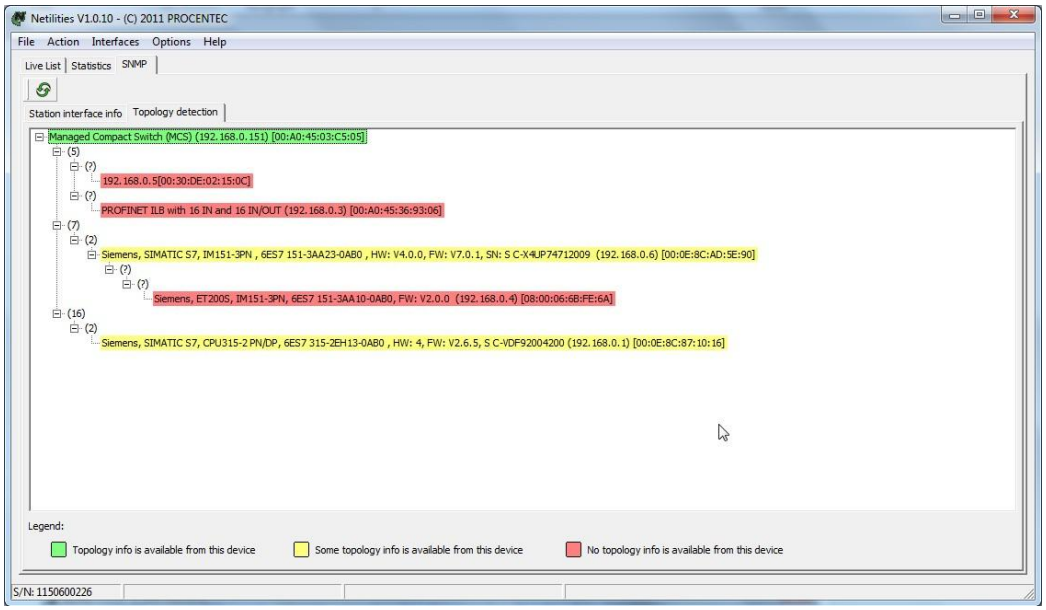
"Management made easy…"

The SNMP functionality can detect the devices in the network. Depending on what a device supports, information like System Uptime, System description, MAC-address, IP-address is displayed.



This information can be updated automatically. It depends on the devices if their information can be updated automatically.
Netilities is also able to detect the topology of the network without shutting down the installation! The Topology detection creates a clear network structure that contains the location of the devices. The result depends on the information supplied by the devices.

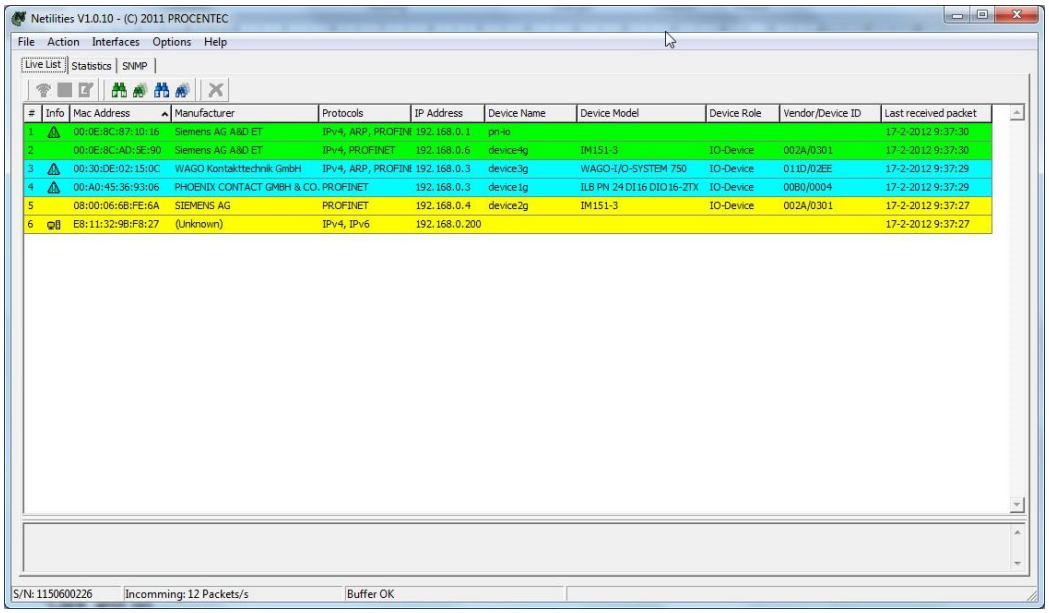
- Green: Topology information is available from the device.
- Yellow: Some topology information is available from the device.
- Red: No topology information is available from the device.



5 Live List

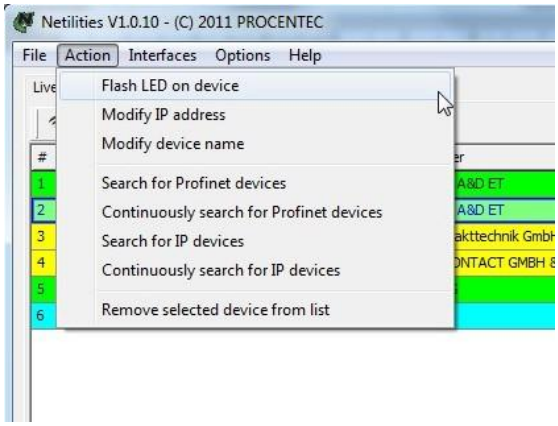
The Live List is a table which continuously lists all the available devices. It is directly visible which devices are active, in data exchange and which devices are inactive. With different background colours, the status of the devices is displayed.

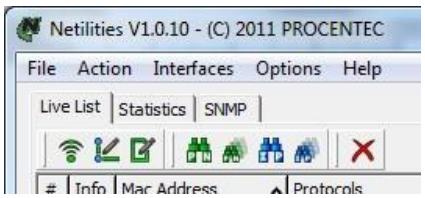
- Yellow: inactive device
  This is because the device is not sending any messages. The problem could be that a device has been lost, or a device has not yet been in data exchange.
- Light blue: Generally active device
  A device is sending messages, but it is not in data exchange with a PNIO-Controller.
- Green: Device in data exchange
  A device is active and it is in data exchange with a PNIO -Controller.



5.1 Live List Actions

The Live List offers several actions to the user. These actions can be accessed via the Action menu or via the buttons on the Toolbar. The following actions are available:

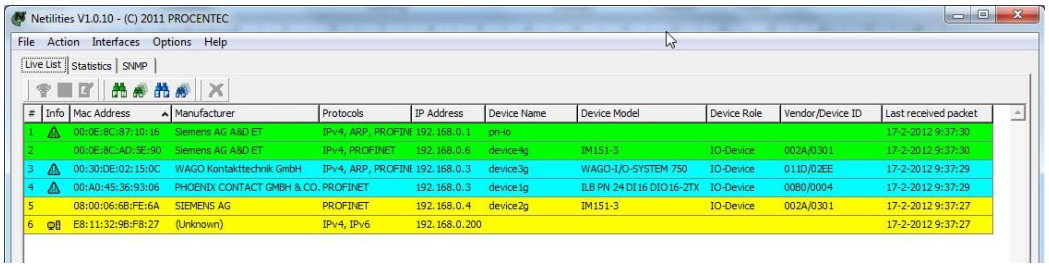




Action	Description
Flash LED on device	Flashes a LED on the selected device. Which LED starts to blink on the device, is dependent on the device. Mostly the Link LED(s) will start blinking.
Modify IP-address	Used to modify or clear the IP-address of the selected device. The IP-address can only be changed when the selected device is not in Data Exchange.
Modify device name	Used to modify or clear the device name of the selected device. The device name can only be changed when the selected device is not in Data Exchange.
Search for Profinet devices	Used to search for PROFINET devices in the network only once.
Continuously search for Profinet devices	Used to continuously search for PROFINET devices in the network.
Search for IP devices	Used to search for IP devices in the network only once.
Continuously search for IP devices	Used to continuously search for IP devices in the network.
Remove selected device from list	Removes the selected device from the Live List. Used for instance to remove devices from the list that are no longer active in the network.
Set to factory defaults	Resets the device to its factory defaults. ***Note:*** *This can be done while devices are in Data Exchange.*

5.2 Live List columns

The Live List shows a number of columns.

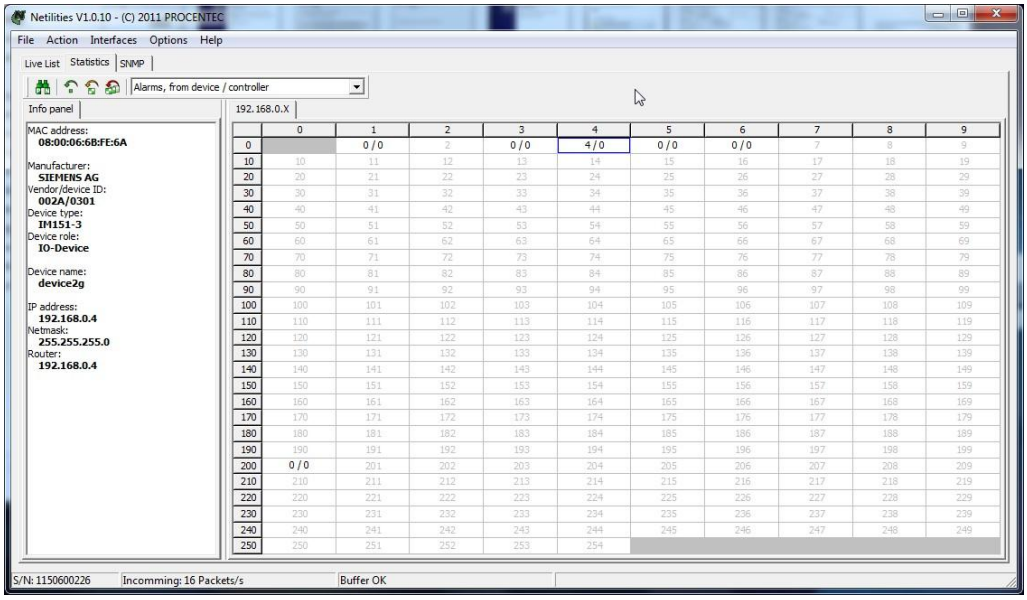


The following table details the information to be found in these columns.

Column	Information
#	The number of a row in the Live List.
Info	In this column icons are used to indicate the type of device, or to warn the user about a problem. The following icons are used: The device in this row encountered a problem. Indicates the device in this row is a network device of the PC on which Netilities is running. Clicking on the row shows a message in the bottom area of the Netilities user interface.
Manufacturer	Displays the name of the manufacturer of the device.
MAC-address	The MAC-address of the device.
Protocols	Displays the protocols used by the device. Commonly used protocols are: • IPv4 Internet Protocol v4 (uses 32-bit addresses) • IPv6 Internet Protocol v6 (uses 128-bit addresses) • LLDP Link Layer Discovery Protocol • ARP Address Resolution Protocol • PROFINET
IP-address	The IP-address in use by the device.
Device name	The configured name of the device.
Device model	The model or type of the device.
Device role	Displays the role of the device. The role can be either PNIO-Controller or PNIO-Device, PNIO-Multidevice or an PNIO-Supervisor.
Vendor/Device ID	Displays both the ID of the vendor and the ID of the device. Both ID are displayed in hexadecimal notation.
Last received packet	Displays the date and time when the last packet was received from the device.

6 Statistics

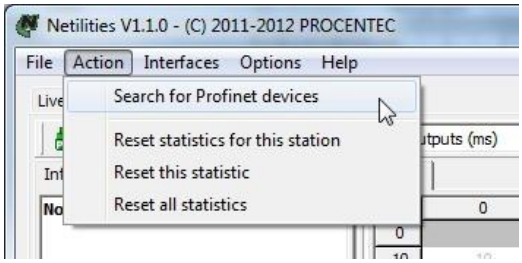
The statistics matrix is the most powerful feature of the analyzer. This field can really indicate what the condition of an installation is. It displays the important information that a user, especially a maintenance technician is really interested in. The different statistics are detailed in the following sections.



The user interface of the Statistics matrix is split into two parts, a part providing extra information and a part displaying the actual Statistics matrix.
The information part, Info Panel, displays extra information of the selected device in the statistics matrix. The information that is displayed depends on what information is available for the selected device. The MAC-address and IP-address are displayed for both PROFINET and IP devices.
The statistics matrix displays the statistics for each device in a matrix representation. The place of a device in the matrix is based on its address, namely the last byte of its IP address. Therefore the matrix can display 254 devices at once.
When more IP-ranges are used, a new tab will be added to the statistics matrix. Each tab corresponds to a certain address range as indicated by the title of a tab.

6.1 Statistics Actions

The Statistics offer several actions to the user.

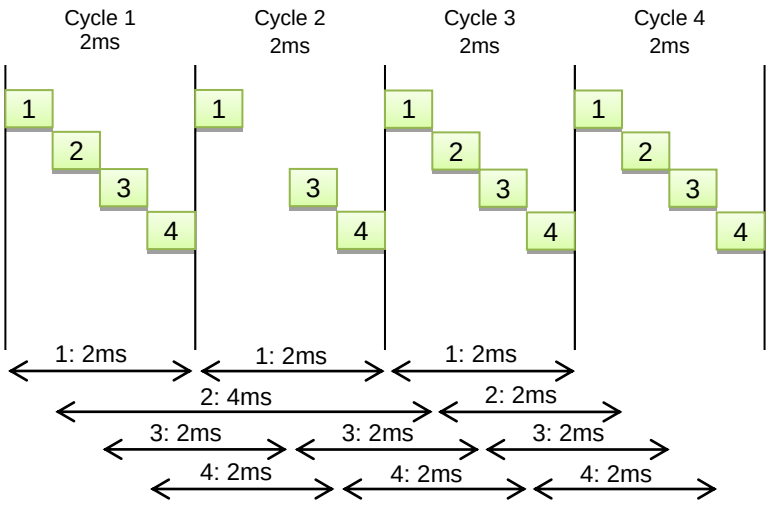


These actions can be accessed via the Action menu or via the buttons on the Toolbar. The following actions are available:

Action	Description
Search for Profinet devices	Used to search for PROFINET devices in the network only once.
Reset statistics for this station	Used to reset all statistics for the selected device.
Reset this statistic	Used to reset the selected statistic for all devices.
Reset all statistics	Used to reset all statistics for all devices.

6.2 Current Cycle Time

With PROFINET the cycle times can be configured per device. This statistic continuously shows and updates the current cycle time for the inputs and outputs of each single device.
The exact timing of PROFINET messages is difficult to determine because it depends on network load and delays that may be added by switches in the network.
Therefore Netilities bases its Cycle Time calculation on the Cycle Counter value of PROFINET messages. Simplified this means that Netilities calculates the difference of the Cycle Counter between received messages. When a message has been missed, it means the difference between the Cycle Counters of the last received message and the current message increases. In this statistic this is shown in multiples of the configured send cycle for a PNIO-Device.
For instance a PNIO-Device is configured with a send-cycle of 2ms. A message of the PNIO-Device goes missing. The current Cycle Time will then become 4ms instead of 2ms.



In a configuration the following cycle time values are possible:

- 1 ms
- 2 ms

- 4 ms
- 8 ms
- 16 ms
- 32 ms
- 64 ms
- 128 ms
- 256 ms
- 512 ms

6.3 Minimum Cycle Time

This statistic shows the shortest cycle time that has been measured for the inputs and outputs of the device. It is continuously measured and updated when a shorter cycle time has been found.

6.4 Maximum Cycle Time

This statistic shows the longest cycle time that has been measured for the inputs and outputs of the device. It is continuously measured and updated when a longer cycle time has been found.

6.5 Transfer status error count

This statistic shows how many input and output messages have had a CRC error and have been marked by a switch as faulty. The last byte of the PROFINET specific data part on an RT and IRT Data Exchange message contains the Transfer Status.

IMPORTANT NOTE only PROFINET switches (cut-through) will forward faulty messages.

6.6 Alarms

This statistic shows the alarms from a device to the controller and from the controller to the device. The alarms can have a low and a high priority. This statistic does not distinguish between the priorities and counts all alarms and also counts the acknowledge of an alarm. An alarm for instance can be:

- Device lost (controller to device)
- Pull alarm (device to controller)
- Plug alarm (device to controller)
- Plug wrong module alarm (device to controller)
- Diagnosis (generally from device to controller)

An extensive list of alarms can be found in the PROFINET Standard.

6.7 PN Data size

This statistic shows the size of the PROFINET specific data part of Data Exchange messages, for both inputs and outputs.

6.8 Absolute Traffic

This statistic gives an indication of traffic on the network by showing the number of packets for both PROFINET and non-PROFINET traffic.

6.9 Relative Traffic

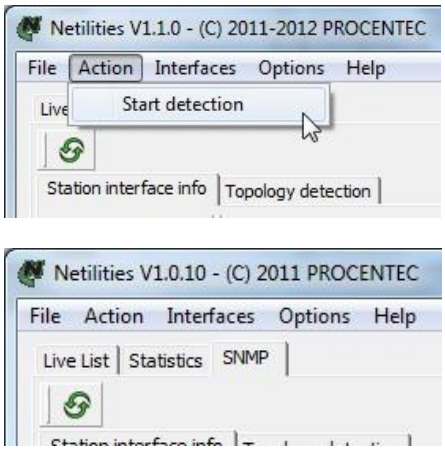
This statistic gives an indication of the network usage for both PROFINET and non-PROFINET traffic by expressing their share as a percentage of the total traffic.

7 SNMP

The SNMP functionality of Netilities allows you to retrieve management information from devices in the network. The information can for instance be the uptime, its MAC- or IP-address of a device. It also enables Netilities to create a topology of the network indicating who is connected to who.
This part of Netilities does not show any data by default. You must start SNMP detection manually in order to see results in Netilities.
The user interface of SNMP consists of two parts, a part providing station information and a part displaying the network topology based on information retrieved through SNMP.
The following sections detail what you can do with SNMP in Netilities.

7.1 SNMP Actions

The SNMP offers a single action to the user.

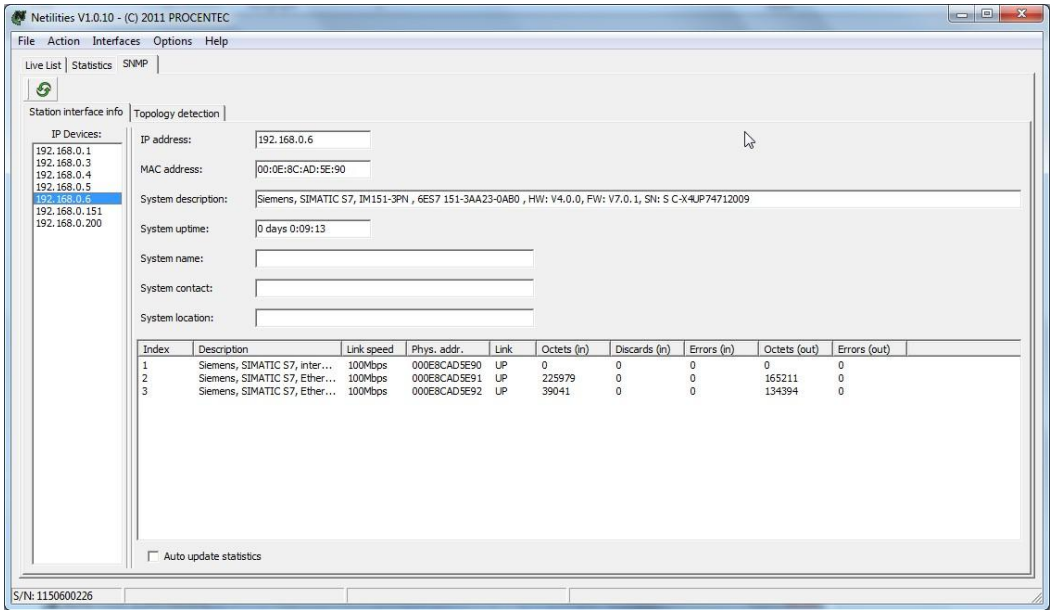


This action can be accessed via the Action menu or via the buttons on the Toolbar. The following action is available:

Action	Description
Start detection	Used to start the detection of devices in the network using SNMP.

7.2 Station interface info

The station interface info shows a list of detected IP devices on the left side of the user interface. The right side of the user interface shows the information of the device selected in the list of detected IP devices. A device can be selected by clicking on it.



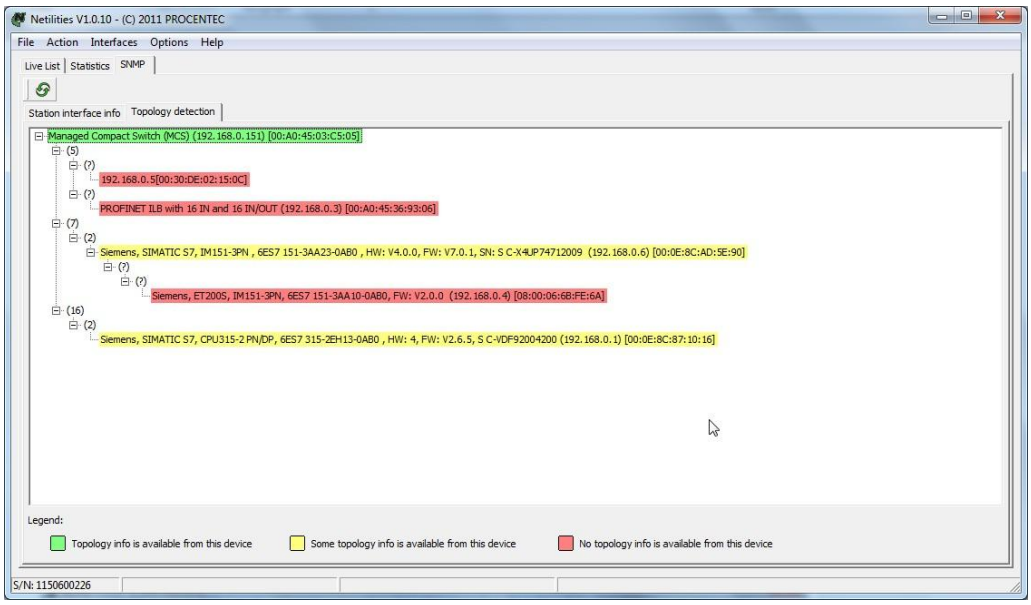
Its corresponding information is then displayed in the fields on the right side. Depending on available information from a device, the following information can be displayed:

Field	Description
IP address	The IP address of the selected device.
MAC address	The MAC address of the selected device.
System description	A short description of the device.
System uptime	The time the device has been up and running.
System name	The name of the device.
System contact	A name or telephone number of a contact person.
System location	The location of the device.
Link information	A table displaying information about the link(s) of the device. The following columns are presented: • Index A sequential number. • Description • Link speed • Physical address • Link Status of the link: UP or DOWN • Octets in • Discards in • Errors in • Octets out • Errors out

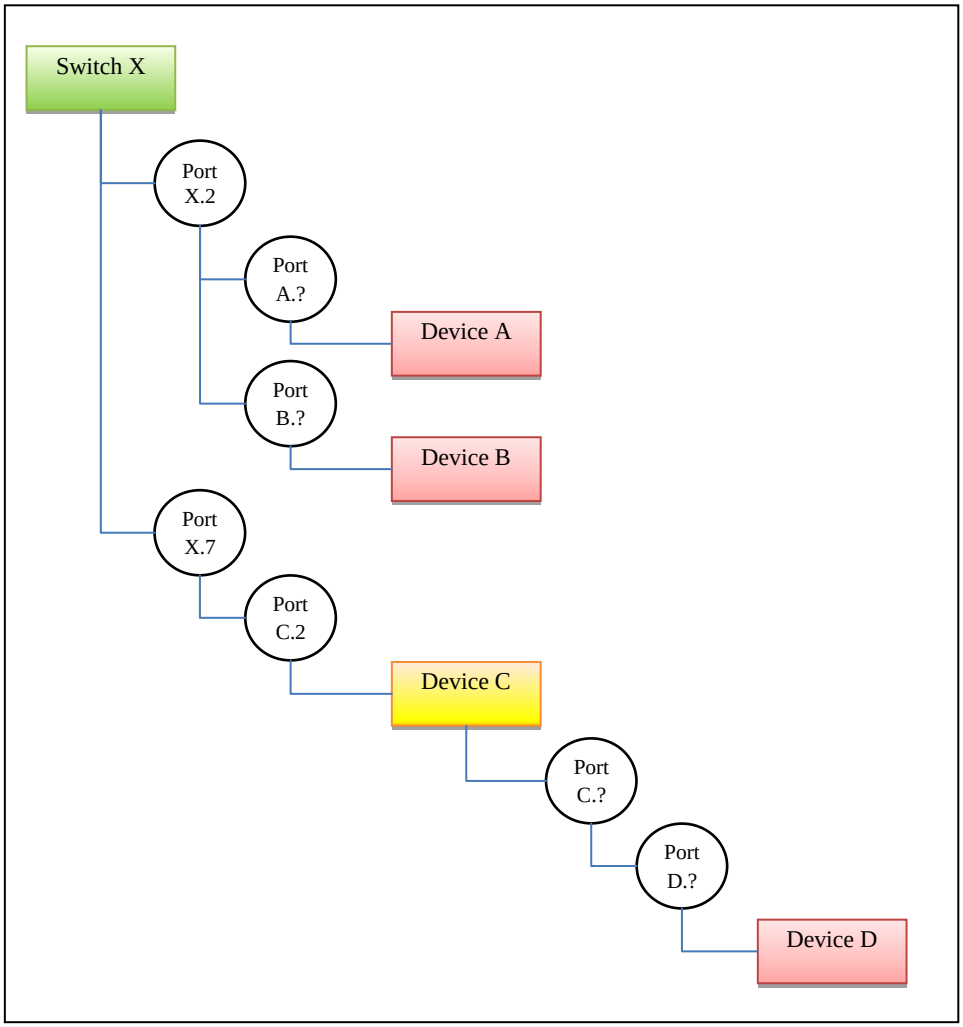
7.3 Topology detection

The Topology detection gives an overview of the topology of your network. It is however dependent on the information provided by the devices in the network. The level of support for topology information is indicated with colours in the topology.

- Green Topology information available.
- Yellow Some topology information available.
- Red No topology information available.



The presentation of the topology is schematically given in the following figure.

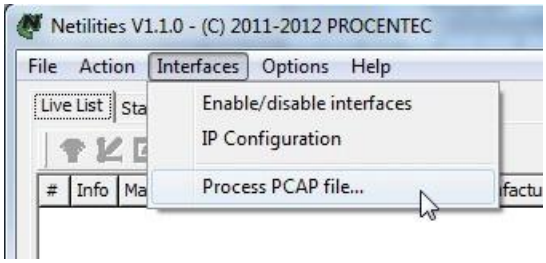


The switch in the figure is a PROFINET switch and provides Netilities with Topology information. Netilities is therefore able to determine which device is connected to which port of the switch. A switch can normally only have one link on a port. However the figure does show a port with two links, to device A and device B. When this is shown in the topology, it means messages from both devices are received through this port of the switch. Probably one of these devices also has a built-in switch, however it does not provide SNMP topology information.
Device C on the other hand is able to provide some SNMP topology information. Therefore Netilities can now distinguish that device D is connected to device C.

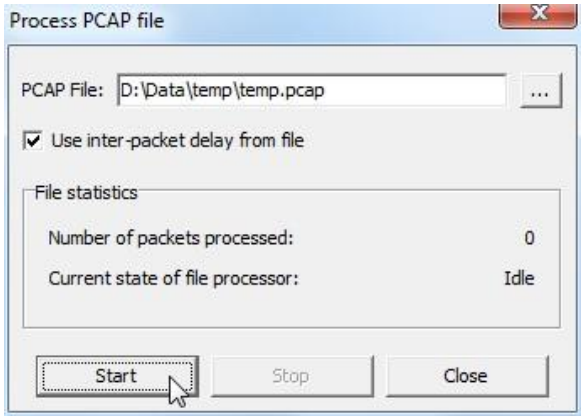
IMPORTANT NOTE:
SNMP must be supported by all devices and it must be possible to retrieve a MAC-list and/or LLDP information.

8 Processing a PCAP file

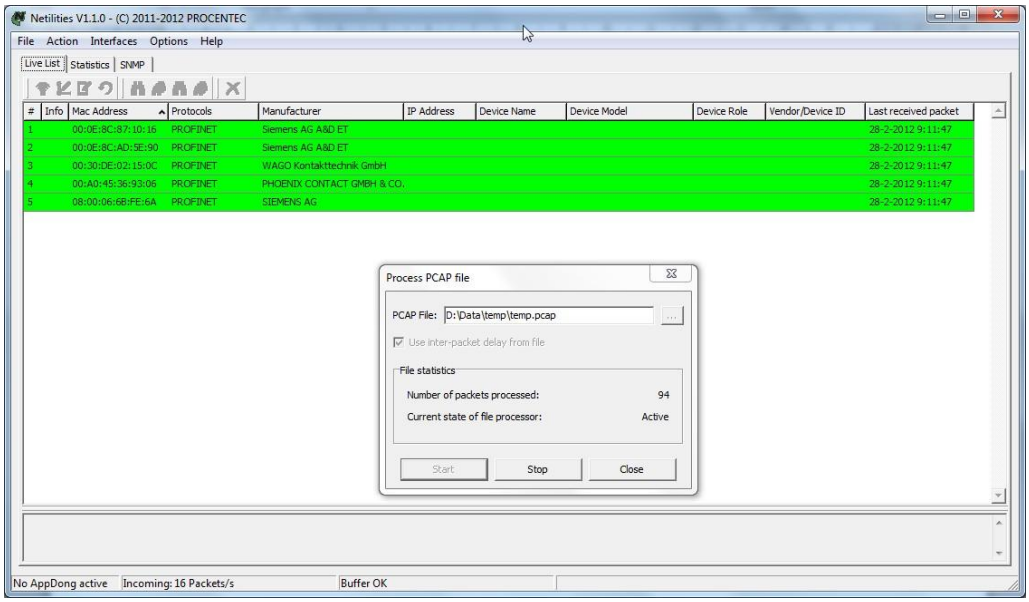
When a packet analyzer like Wireshark is used, you can save the captured packets into a file. This is called a PCAP file. With Netilities you are able to import and process the packets of a PCAP file. The packets are processed in a similar fashion as if they came from a network interface.
Therefore the action can be found in the Interfaces menu.



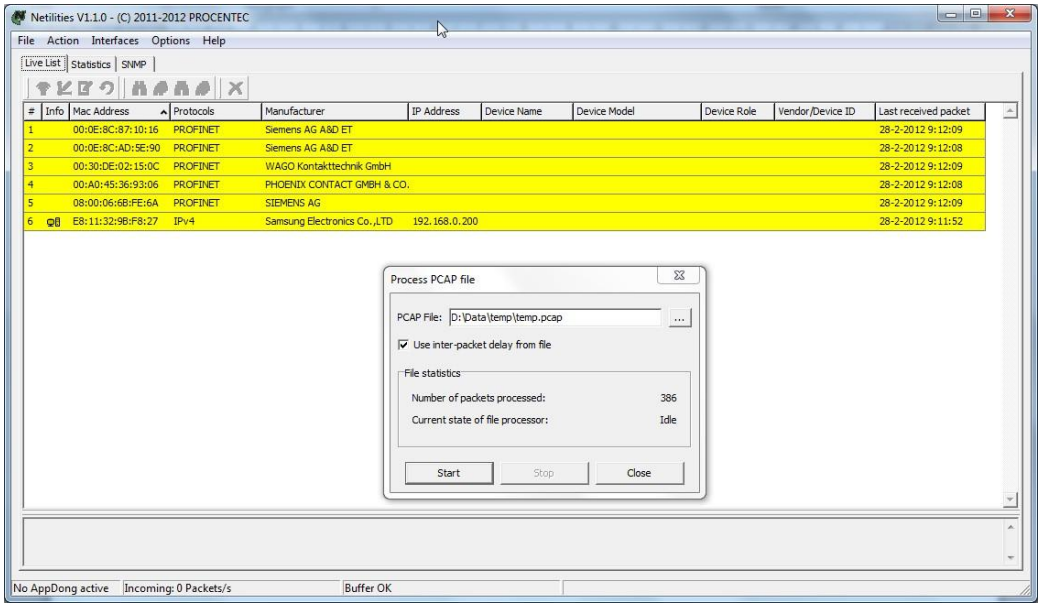
The first step in processing a PCAP file is to select the file to process. Once the file has been selected you can start processing the file by clicking on the “Start” button in the dialog.



The information provided in File statistics is updated during processing. As the packets from the file are processed the Live List and statistics are also updated.



Therefore the Live List shows the devices as if the packets came from a live installation.
When all the packets from the file are processed the file statistics show how many packets have been processed and that the processor is back in its idle state.



9 IP Configuration

To start the IP configuration, go to the menu: Interface -> IP Configuration. When you start the configurator, a popup box will appear like in Figure 1 (Windows XP) or Figure 2 (Windows 7).

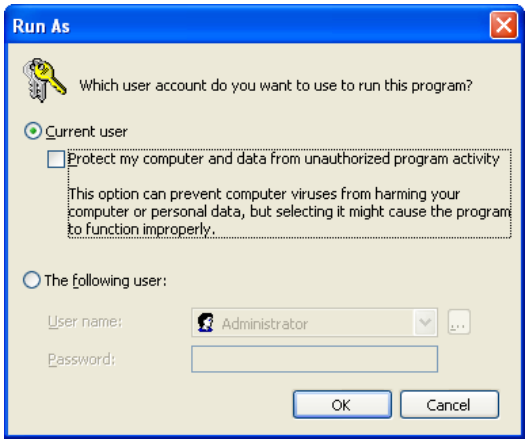


Figure 1 Popup in Windows XP

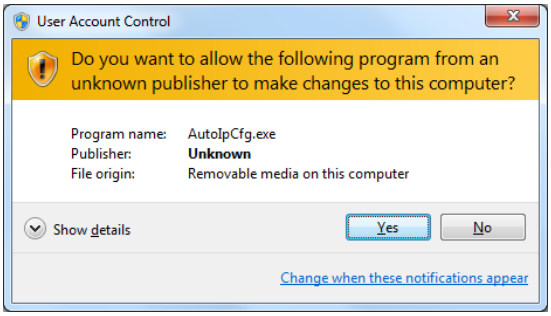


Figure 2 Popup in Windows 7

Please make sure the configurator is granted full administrator rights. If you cannot grant administrator rights to the configurator, due to restrictions on your laptop or PC, this function will not work.
When the configurator is started, there will be an icon in your Windows tray ( ).
Netilities will communicate with this application to configure your Ethernet interfaces.

When the configurator has been started, a window will pop up like in Figure 3. In this window you can create new and modify existing profiles. You can also activate or deactivate them. When a profile has been activated, the selected Ethernet interface will adapt to the settings of the profile. An Active profile has a green circle in front of it; an inactive profile has a grey circle in front of it.

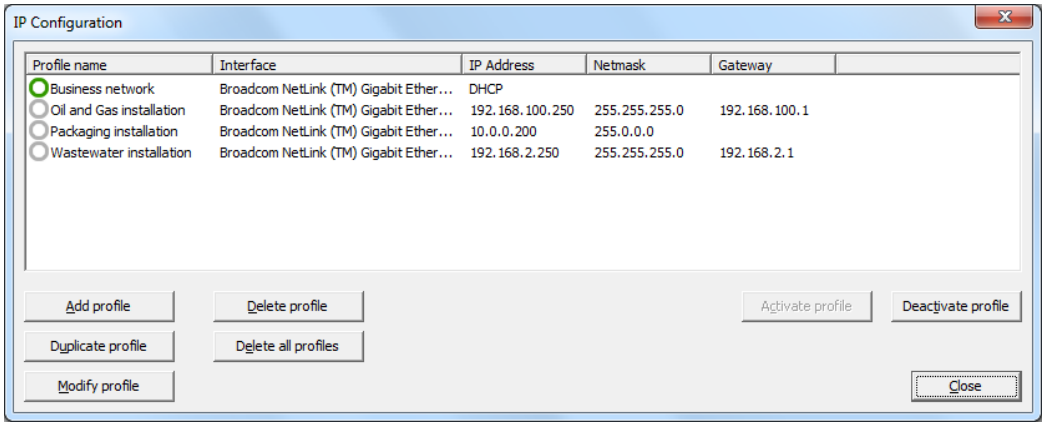


Figure 3 IP Configurator user interface

When adding a new profile, you have to enter a profile name and select which interface should be used for it. If you select DHCP, the IP Address, Netmask and Gateway can be left blank. If you don't select DHCP, you have to enter an IP address and Netmask. The Gateway is optional.
If you have created one or more profiles and you run Netilities on another laptop or PC, the profiles interfaces should be altered to the interfaces on the new system. A popup window will appear which allows you to fix the interface of each profile. The popup window looks like Figure 4.

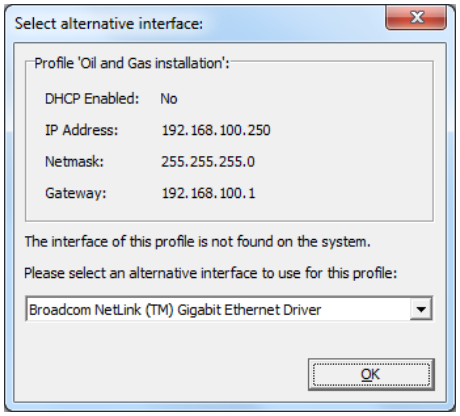


Figure 4 Select interface popup

When you close Netilities, all active profiles will be disabled and the original settings of your Ethernet interfaces will be restored.

NOTE: When you change the IP address of an interface, you have to refresh the interfaces' IP addresses in the interfaces window (menu: Interfaces -> Enable/Disable interfaces, then click Refresh).

10 Using ProfiTap

A characteristic of PROFINET is that in the data exchange telegram there is no distinction possible between controller and device telegrams when only sniffing is done using ProfiTap. This makes it impossible to determine certain information.
Normally the "Search for Profinet devices" button in Netilities can be used to ask all PROFINET devices to identify themselves and to indicate which functionality they have. For this functionality telegrams need to be sent, which is not possible if you only have a ProfiTap.
Therefore it is possible to manually assign functionality to a certain MAC address/device. For the statistics visualization in combination with a ProfiTap, it is necessary to correctly assign the PNIO-Controller. To do this, click on a station in the Live List and then press the right mouse button. A popup will appear in which a functionality can be assigned to the device, see Figure 5. These functionalities can be assigned to a device:

- ❑ Controller
- ❑ Device
- ❑ Multidevice
- ❑ Supervisor

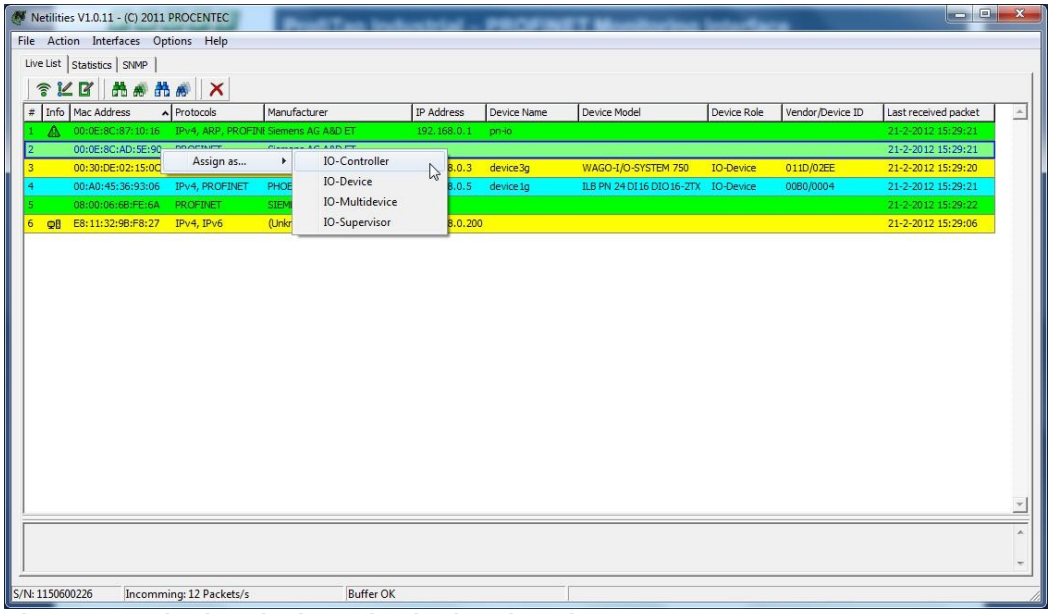


Figure 5 Assigning device roles in the Live List

IMPORTANT: There are different modes of operation & situations when doing Ethernet diagnostics, for using ProfiTap this is detailed in the next section.

10.1 Set-up

10.1.1 Only ProfiTap

- All telegrams can be seen, but no telegrams can be sent.
- If the startup procedure of the PNIO-Controller is not captured, the information visible is limited.
- A connection must be broken to insert the ProfiTap cabling

- Basically only a list of devices in data-exchange can be seen.
- Manually assigning functionality is needed.
- SNMP info can NOT be retrieved

Steps:

1. Connect ProfiTap to the USB port.
2. Start Netilities and select the Ethernet interface.
3. Connect the Ethernet cables.
   Preferred location: On PNIO-Controller port.
4. You have to manually assign a MAC address to a functionality:
   Controller, Device, Multidevice, Supervisor in order for the statistics to be visualized correctly.

10.1.2 ProfiTap + PC/Laptop connected to a free port on the PROFINET Switch

- All telegrams can be seen.
- Telegrams can be sent.
  (useful to identify all Profinet devices & controllers, e.g. DCP functionality)
- A connection must be broken to insert the ProfiTap cabling
- SNMP information can be retrieved.

Steps:

1. Connect ProfiTap to the USB port.
2. Start Netilities and enable both Ethernet interfaces.
3. Connect the Ethernet cables.
   Preferred location: The ProfiTap on the PNIO-Controller port and the PC on a free port of the switch.

11 Tutorial

This chapter contains some exercises to enhance the practical knowledge of Netilities. In order to do these exercises:

- ❑ it is required to connect Netilities, the PC it runs on, to a working installation with a PNIO-Controller that has at least two PNIO-Devices in Data Exchange.
- ❑ To have a tool with which configurations can made, modified and uploaded to the PNIO-Controller.

11.1 First steps

11.1.1 Assignment 1: First steps

- ❑ Insert the Netilities dongle in your PC.
- ❑ If Netilities is run for the first time on the PC, or the PC does not have Wireshark installed, install the WinPcap driver supplied with Netilities.
- ❑ Start Netilities from the dongle.
- ❑ Go to menu Interfaces -> Enable/disable interfaces.
- ❑ Select the interface that is connected to the PROFINET installation.

When the software is running, the Live List of the PROFINET installation should be visible.

- ❑ Check the Live List by switching the PLC ON/OFF.
- ❑ Close Netilities when this assignment is ready.

11.1.2 Assignment 2: Create a network drawing

- ❑ Create a drawing of the PROFINET network (finish it within 15 minutes).

Remarks:

- Clearly indicate the location of the devices on the ports of the switch(es). If you want to know which device is on which port, just switch OFF a device and look at the LEDs on the switch.
- Register the MAC addresses of the devices.

11.1.3 Assignment 3: Assessment of the connected devices

- ❑ Start Netilities and enable the network interface.
- ❑ How many IO-Controllers and/or PNIO-Devices does the installation have?
- ❑ Does the Live List correspond with your drawing?

11.2 Netilities Live List

11.2.1 Assignment 4: Interpretation of the Live List colours

Fix each fault after a specific step

- ❑ Switch a PNIO-Device OFF or remove the PROFINET connector and investigate the Live List.
- ❑ Fix all faults after this assignment!

11.2.2 Assignment 5: Changing a device name

- ❑ Change the device name of a PNIO-Device while it is in Data Exchange. *Does this work?*
- ❑ Change the device name of a PNIO-Device in your configuration and use CAPITAL LETTERS and upload the new configuration to the IO-Controller.
- ❑ Investigate the Live List.
- ❑ Change the device name of the PNIO-Device to match the new configuration, but don't use the CAPITAL LETTERS. Investigate the Live List (don't forget to switch the PNIO-Controller OFF/ON).
- ❑ Is the device name case sensitive or not?
- ❑ Change the device name of a PNIO-Device to match another PNIO-Device and investigate the Live List (don't forget to switch the PNIO-Controller OFF/ON).
- ❑ Fix all faults after this assignment!

11.2.3 Assignment 6: Changing an IP-address

- ❑ Change the IP-address of a PNIO-Device while it is in Data Exchange. *Does this work?*
- ❑ Change the IP-address of a PNIO-Device and investigate the Live List (don't forget to switch the PNIO-Controller OFF/ON).
- ❑ Change the IP-address of a PNIO-Device to match another PNIO-Device and investigate the Live List (don't forget to switch the PNIO-Controller OFF/ON).
- ❑ Fix all faults after this assignment!

11.2.4 Assignment 7: Set to factory defaults

- ❑ Change the IP-address of a PNIO-Device while it is in Data Exchange. *Does this work?*

11.3 Netilities Statistics

11.3.1 Assignment 8: Current cycle time

- ❑ Investigate the Live List and check if your installation is running according to your configuration.
- ❑ Open the Netilities Statistics.
  When no devices are listed, click on the "Search for Profinet devices" button.
- ❑ Select "Current cycle time, inputs / outputs (ms)" as the statistic.
- ❑ Investigate the statistics for each device and check whether or not the cycle times correspond with your configuration.

11.3.2 Assignment 9: Alarms

- ❑ Reset all the statistics.
- ❑ Select "Alarms, from device / controller" as the statistic.
- ❑ Investigate the statistics and check they all are 0 / 0.
- ❑ Generate an alarm event (Device lost, Pull/Plug alarm, Plug wrong module) and investigate the statistics.
- ❑ Fix all faults after this assignment and check it with the Live List!

11.4 Netilities SNMP

IMPORTANT NOTE:
SNMP must be supported by all devices and it must be possible to retrieve a MAC-list and/or LLDP information.

11.4.1 Assignment 10: Station interface info

- ❑ Investigate the Live List and check if your installation is running according to your configuration.
- ❑ Open the Netilities SNMP.
- ❑ Start detection.
- ❑ Check if the results of the detection in the Station Interface info correspond with your network drawing.
- ❑ Check the system uptime of your PNIO-Controller.

11.4.2 Assignment 11: Topology detection

- ❑ Open the Topology detection.
- ❑ Expand all nodes.
- ❑ Check if the information displayed at the nodes corresponds with your network drawing.

12 Technical data Netilities appdong

To be defined.

13 Frequently asked questions

Why can't Netilities locate any network interfaces?
This probably is because the WinPCap Driver is not started. The easiest way to solve this is to uninstall the WinPCap Driver and to reinstall it again. This time making sure the checkbox "Start WinPCap upon Windows Startup" is checked at the last step before you press Install.

SNMP

SNMP Detecting devices remains at 0%

- This could be because of the TCP/IP settings of your network interface that is used to connect to the PROFINET switch. Check if a correct and free IP-address is configured for the interface, and it is in the same range as the PROFINET installation. An indication for this is the IP-range shown in Netilities is set to 0.0.0.0/255.255.255.0.
- The mirror port of the switch does not have the capability to send telegrams. In this situation Netilities is unable to retrieve SNMP information.
  This can be fixed by using a ProfiTap and connecting your PC to a free port on the PROFINET Switch, see chapter 8 "Using ProfiTap" for more information.

SNMP Topology detection does not show a topology
This could be because of one or more switches that have not been assigned an IP-address. Most probably the PROFINET switch the Netilities PC is attached to. Check if a correct and free IP-address is configured for each switch in the installation, or check if it is a managed switch (a PROFINET switch).

Hardware requirements

Which USB version is supported?
Netilities appdong supports high speed USB 2.0.

For the latest FAQ list check out our website!

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15 Products and spare parts

Component	Order code	Remarks
Netilities basic	39020	• USB appdong containing Netilities and license.
 **ProfiTap**	513-00011A	• ProfiTap • USB cable • Hookup cable • Software and drivers • Manual

17 Glossary

CRC	Cyclic Redundancy Check.
CSV	Comma Separated Values. A file format frequently used for exporting information in an easy to understand format.
Data Exchange	The state of a PNIO-Device after parameterization and configuration has been completed, in which it cyclically exchanges I/O data with an IO-Controller. Normally the PNIO-Device stays forever in Data Exchange until the bus communication or device are stopped.
DIN	German Institute for Standardization (www.din.de).
Electromagnetic Compatibility	See *EMC*.
EMC	The extent to which an electric or electronic device will tolerate electrical interference from other equipment (immunity), and will interfere with other equipment. Within the European Community as well as in other countries it is regulated by law that electric and electronic components and equipment comply with basic standards such as IEC 61000-6-2 or IEC 61326 or corresponding individual product standards.
End Delimiter	This byte identifies the end of a PROFIBUS message and has a fixed value of 16 Hex.
FCS	*See Frame Check Sequence.*
Frame Check Sequence	It is a field in the PROFIBUS message that holds a checksum to check the integrity of the message. It is simply the sum of the bytes. Checksum = (DA + SA + FC + DU) mod 256. This is simply the bytes added together and divided by FF Hex (255). This is an integrated function that is normally performed by the PROFIBUS ASIC.
GSD file	Generic Station Description. It is provided by the device manufacturer and contains a description of the PROFIBUS or PROFINET device. GSD files provide a way for an open configuration tool to automatically get the device characteristics.
GSDML file	A GSD file based on XML. This is always used for PROFINET.
IRT	Isochronous Real Time.

Jitter	The cycle times may differ slightly from one to another. This phenomenon is called **jitter**. For PROFINET Jitter is the unwanted variation in the cycle time that could jeopardize real-time performance. For IRT communication the jitter must be less than 1µs, for all cycle times. For RT communication the jitter must be below 15% of the cycle time.
LAN	Local Area Network.
Live List	The Live List is a matrix that lists all the available devices. It is directly visible which devices are active, in data exchange and which devices are inactive. With different background colours, the status of the devices is displayed.
MAC address	Media Access Control address, a unique identifier assigned to network interfaces for communications on the physical network segment.
PCB	Printed Circuit Board.
PI	PROFIBUS International. The International PROFIBUS Organization based in Karlsruhe.
PNO	PROFIBUS Nutzer Organization. The German PROFIBUS Organization based in Karlsruhe.
ProfiTap	ProfiTap Industrial is an interface to perform monitoring on PROFINET networks.
SNMP	Simple Network Management Protocol (SNMP) is an Internet-standard protocol for managing devices on IP networks.
Switch	A computer networking device that connects network segments.
Topology	In a communications network, the pattern of interconnection between network nodes; e.g. bus, ring, star configuration.
WinPcap	WinPcap is the industry-standard tool for link-layer network access in Windows environments: it allows applications to capture and transmit network packets bypassing the protocol stack, and has additional useful features, including kernel-level packet filtering, a network statistics engine and support for remote packet capture.
WLAN	Wireless LAN.
XML	eXtensible Markup Language.

18 About PROCENTEC

PROCENTEC is an independent company, concentrating all its products and services on PROFIBUS and PROFINET technology. Our main business is the export of in-house developed automation products through our worldwide distributor network. PROCENTEC is also providing vendor independent training and support to end-users.

We are an international PROFIBUS and PROFINET Competence/Training Center with all the required expertise available to realize our projects and services. We have the availability of some real experts whose knowledge makes us unique in the world. Because of our international recognition we are often contracted and offer a wide range of commercial services (consultancy, training, commissioning, maintenance and troubleshooting). PROCENTEC has 2 offices; the headquarters is based in The Netherlands and a sales office is located in Germany.

Testlab
PROCENTEC runs 1 of the 8 accredited test laboratories for the certification of PROFIBUS devices. In our laboratory vendors can have their products tested on PROFIBUS compatibility.

Product development and export
We develop in house PROFIBUS and PROFINET products that are being exported through our worldwide distributor network. Especially in the area of maintenance tools we have gained a unique market position.

Democenter
We have a demonstration facility, which is used for support, training, demonstrations, engineering and trade fairs. It consists of more than 250 devices from more than 40 vendors.

Training and Education
PROCENTEC is very successful with its training program. Up to now, more than 4000 participants have received a certificate. The costs incurred for engineering, assembly, commissioning and maintenance always play a key role when choosing a fieldbus. We train our participants that the implementation of PROFIBUS and PROFINET can help to cut costs in all areas. Our practical experience is the key factor! PROCENTEC offers different types of PROFIBUS and PROFINET training modules which are organised on a regular basis.

PROCENTEC is a professional organisation, which is involved in PROFIBUS and PROFINET technology 24-hours a day. It has the availability of experts who are constantly deployed worldwide. Not only is the tried and tested automation technology ideal for the use in both Factory and Process automation, but support is also ensured through the products and services of PROCENTEC.

www.procentec.com

19 Certificates

QualityMasters
Management Systems Registrars

certificate

QualityMasters hereby declares that

Procentec
WATERINGEN

has a management system that meets the requirements of the standard

NEN-EN-ISO 9001:2008

for the scope

Providing training courses, technical support, product development and the exploitation of the test laboratory.

Date of original approval	10-02-2003
Date of issue	11-08-2010
Valid until	11-04-2013
Certificate number	NL 5147

On behalf of Stichting QualityMasters,

N.B. The failure to meet the conditions as set forth in the certification agreement, or non-compliance with the given standard and/or guidelines, may lead to the suspension or cancellation of the certificate. This certificate remains the property of Stichting QualityMasters, Daggeldersweg 10, 3449 JD Woerden.

PI
PROFIBUS • PROFINET

Certificate
for a PI Competence Center

PI confirms that

PROCENTEC
Dennis van Booma
Turfschipper 41
2292 JC Wateringen
THE NETHERLANDS

is a fully accredited PI Competence Center for
PROFIBUS basic
PROFIBUS PA.

This certificate is granted according to the Quality of Services Agreement for PI Competence Centers and is valid for 2 years, until December 31, 2011.

(Official in Charge)

Chairmen of PI

(Jörg Freitag, Chairman)

(Michael J. Bryant, Deputy Chairman)

PROFIBUS®

PROFIBUS • PROFINET

Certificate

Authorization as PI Test Laboratory for PROFIBUS

PROFIBUS Nutzerorganisation e.V. accepts
PROCENTEC
Turfschipper 41
2292 JC Wateringen
The Netherlands

as authorized PI Test Laboratory for:

PROFIBUS Slave Devices

PA Profile Devices

The authorization is based on the assessment dated March 4, 2011, and the related assessment report.

The execution of the tests aimed in the PROFIBUS certification shall be conform to the PROFIBUS Standard and the valid guidelines.

This authorization is valid until December 31, 2012.

(Official in Charge)

Board of PROFIBUS Nutzerorganisation e. V.

(J. Freitag) (K.-P. Lindner)

PROFIBUS®

20 Revision History

Version 0.0.1.2
- The initial version of the Netilities manual

21 Next versions

- Detail the SNMP Topology detection chapter with a drawing of an example installation.
- Add a photo of the Netilities appdong USB-stick.
- Add technical data of the Netilities appdong USB-stick.
- Add a section which describes how Netilities is connected to an installation.

Glossary
To be defined.

22 Notes

Other PROCENTEC products

PROFINET Cable Tester

- ✓ Suitable for 4- and 8-wire PROFINET and regular Ethernet cables
- ✓ Suitable for straight and 90°, metal or plastic PROFINET plugs
- ✓ Tests cable shielding
- ✓ Detects short circuits, wire breaks, swaps, miswiring and split pairs
- ✓ Large LCD clearly indicates the test results
- ✓ 150 hours on one 9 V battery
- ✓ Operating temperature: 0 to 50 °C
- ✓ Just 1-key-press to start continuous testing
- ✓ It can also test telephone and coax cable

www.profinetcabletester.com

Compact PROFIBUS Repeater

- ✓ Single channel PROFIBUS repeater
- ✓ Transparent
- ✓ Increased signal strength
- ✓ 12 Mbps
- ✓ Auto baudrate detection
- ✓ Redundant power supply
- ✓ Digital glitch filtering
- ✓ No limit in cascading
- ✓ Integrated switchable termination
- ✓ Diagnostic LEDs
- ✓ DB9 connector for measurements
- ✓ **IP 20 with DIN-rail mounting**

www.procentec.com/profihub/b1/en

Other PROCENTEC products

ProfiHub B5

- ✓ 5 Isolated channels
- ✓ Transparent
- ✓ Increased signal strength
- ✓ 31 devices per channel
- ✓ 12 Mbps
- ✓ 1200 m spur line length
- ✓ No address required
- ✓ Integrated switchable termination
- ✓ LEDs to indicate termination is ON
- ✓ Screw terminals and DB9 connectors
- ✓ **IP 20 with DIN-rail mounting**

ProfiHub A5

- ✓ 5 Isolated channels
- ✓ Transparent
- ✓ Increased signal strength
- ✓ 31 devices per channel
- ✓ 12 Mbps
- ✓ 1200 m spur line length
- ✓ No address required
- ✓ Integrated switchable termination
- ✓ **IP 65 classification**

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