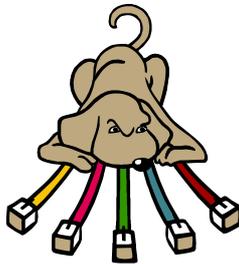


**Miray Stand-Alone-Tool-Series**



# **NetSniffer**

## **Version 1.0**

### **User's Manual**



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# 1. INTRODUCTION

## 1.1. Preface

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As NetSniffer is self-booting, you do not need an installation in the usual sense. However, these contain an installation program to create a bootable floppy disk in the first instance. Chapter → 2. *Installation* shows in a few simple steps how you create a bootable disk by means of the installation package that you have downloaded or been sent. Once having created this disk you can start (→ 1.4. *Program Start*) and use (→ 3. *Program Guide*) NetSniffer on every PC without any further installation.

This manual explains to you in chapter → 3. *Program Guide* step by step and detailed the user interface of NetSniffer and how to operate it. Chapter → 4. *Additional Information* goes into some details about the data formats used by NetSniffer. In chapter → 5. *Supported Adapters* you find detailed information about the supported network adapters.

Nevertheless, in case of encountering any problems using the program, you find useful information in chapter → 6. *TroubleShooting*. If this also does not help solving the problem you are welcome to contact our support ([support@miray.de](mailto:support@miray.de)). We also appreciate obtaining your suggestions of improvement under [feedback@miray.de](mailto:feedback@miray.de).

## 1.2. Fields of Use

---

NetSniffer makes it possible to track the network traffic between arbitrary devices within a LAN segment. The data received during this process are displayed by NetSniffer as raw data, i.e. each byte of a network packet is displayed individually. Additionally, packet size and protocol type of the network layer (e.g. IP, ARP etc.) as well as the MAC address of sender and recipient are displayed. Based on these abilities, NetSniffer has different areas of use:

- **Functional Tests:** On the one hand it is possible to test if a certain PC within the network actually receives data by starting NetSniffer on this PC. On the other hand NetSniffer can be run additionally on a third PC and display the network packets ex-

changed between the remaining devices. This allows to determine which devices in the network generally receive data and which devices send data.

- **Communication Monitoring:** NetSniffer makes it possible to inspect network traffic manually on the lowest level possible. The raw data displayed in NetSniffer allows to track in detail what kind of data is being exchanged within the network. As the addresses of sender and recipient are also reported, it is easy to determine source and destination; additionally, display of the network protocol eases assignment.
- **Hardware and Software Development:** When developing hardware and software for network communication, NetSniffer allows to verify as well sent as received packets at the link layer level byte by byte.
- **Education and Training:** With NetSniffer it is easily possible to complete theoretically gathered contents in the field of network packets and protocols with practical experience and to become familiar with the different types of network packets, for example by reading along the raw data and identifying headers and user data.

**Remark:** Due to lack of a larger buffer the current version of NetSniffer is just barely practical for use a network with permanently high data rates. This version of NetSniffer is rather designed for testing operation in networks with low traffic. Indeed there may be an improvement here by using a NE2000 network adapter, as these have an integrated hardware buffer.

## 1.3. Compatibility

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NetSniffer runs on 486 or higher PCs with at least 4 MB RAM, keyboard and VGA. Additionally an internal 3.5"/1.44 MB floppy disk drive or a bootable CD-ROM drive is needed. Furthermore, for a useful deployment the used system should contain one of the supported PCI or ISA network adapters (→ 5. *Supported Adapters*).

### 1.3.1. Hardware Requirements

- PC 486 or higher, 4 MB RAM, VGA, keyboard
- bootable internal floppy disk or CD-ROM drive
- NE2000 or PCI network adapter (→ 5. *Supported Adapters*)

## **1.4. Program Start**

---

Insert the bootable floppy disk or CD-ROM into the appropriate drive. Switch on or re-start the PC. If necessary, ensure in the BIOS setup that the particular floppy or CD drive will be booted. NetSniffer then will be started from floppy disk or CD-ROM automatically. You will be displayed program screen directly. For further steps in operating the program continue in chapter → 3. *Program Guide*.

## 2. INSTALLATION

### 2.1. Introduction

---

#### 2.1.1. Bootable Disk

If you received the program already on a **bootable floppy disk** or on a **bootable CD**, no further disk creation is needed. In this case, please proceed with step → 1.4. *Program Start*.

#### 2.1.2. Software Package

If you received the program as an installation package (= software package), you will need a 3.5" floppy disk. Proceed with step → 2.2. *Installation Package* in the associated subsection, depending on whether you received the installation package as **.zip**, **.exe** or unpacked file.

#### 2.1.3. Short Guide

The following short guide is sufficient in most cases. If you encounter any problems or prefer a more detailed installation guide, please continue with reading in the following chapters.

Insert a formatted 3.5"/1.44 MB floppy disk into floppy drive A:. Any data on this floppy disk will be deleted, so please make sure not to use a floppy disk with data you might need later on. Please start the installation program that comes with the installation package. Initiate the creation of the floppy disk within the installation program. After completion of this process you have a **bootable floppy disk**. You can boot the installed program from this floppy disk on any PC (from 386/486, consult the hardware specifications) you want to – see also → 1.4. *Program Start*.

## **2.2. Installation Package**

---

### **2.2.1. Compressed Installation Package (.zip)**

If you received the installation package in form of a packed file (.zip), you have to unpack it into a directory of your choice. Then you can start the associated installation program contained in this package. Proceed in chapter → 2.3. *Installation Program*.

### **2.2.2. Self-Extracting Installation Package (.exe)**

If you received a self-extracting installation package (.exe), you only have to execute the file. The installation process will be extracted and started automatically. Please proceed in chapter → 2.3. *Installation Program*.

### **2.2.3. Plain Installation Package**

If you have an installation package that is not compressed, you can usually start the installation process directly from the directory the installation files are located in. If this does not work, copy all files into a directory of your choice. Execute the installation program right from this directory and proceed in chapter → 2.3. *Installation Program*.

### **2.2.4. Disk-/ISO-Image & other Operating Systems**

If you have a disk image of the program or if you are unable to use the installation program for Windows, please create the bootable disk as described in → 2.3.2. *Building from a Floppy Disk Image*, → 2.3.3. *Building a Bootable CD* or → 2.3.4. *Building a CD from an ISO-Image*.

## 2.3. Installation Program

### 2.3.1. Using the Installation Program

#### 2.3.1.1. Main Window

When starting the installation program the main window appears (→ *fig. 1*). It contains 4 elements to control and display the current installation state:

- The **progress bar** (1) indicates the current completion state of the bootable floppy disk.
- The **status bar** (2) displays the current installation state and possibly occurring errors.
- The **start button** (3) starts building a bootable floppy disk.
- To **Exit** the installation program press the finishing button (4).



Fig. 1: main window of the installation program

For starting the installation of the program, insert an empty floppy disk into drive A:. Then click on “*Start Installation*”.

#### 2.3.1.2. Security Check

Before starting the installation, a security prompt (→ *fig. 2*) will appear. Please ensure that there is a floppy disk in drive A: and that it does not contain any important data you possibly need later on. All data on the floppy disk will be deleted during the installation. If you are ready to proceed with the installation, click “*OK*”. The installation process will start immediately. By clicking “*Cancel*” you return to the main window without installing.



Fig. 2: security check

### 2.3.1.3. Error Message

In case of getting an error message (→ *fig. 3*), one of the following reasons may be responsible:

- there is no floppy disk in the disk drive,
- the floppy disk is write protected or
- the floppy disk used is defective.

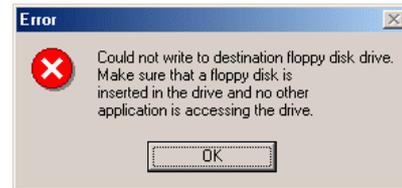


Fig. 3: error message

Therefore replace the floppy disk if necessary respectively remove the write protection and confirm the error message with "OK". Thereafter you will get back to the main window again and have to start over with the installation process as described in → 2.3.1.1. *Main Window*.

### 2.3.1.4. Finishing the Installation

After successfully having built a floppy disk, you get a notification in form of a dialog window (→ *fig. 4*). Confirm this window with "OK". Afterwards click on "Exit" in the main window (→ *fig. 1*) to close the installation program. Continue reading in chapter → 1.4. *Program Start*.



Fig. 4: installation complete

## 2.3.2. Building from a Floppy Disk Image

You can also use a floppy disk image for simply building a bootable medium. Since the installation program of miray Software currently runs on Windows only, this is especially recommended if you are using a different operating system. You can use the floppy disk image with a disk-imaging program of your choice. It is stored as a 1.44 MB image for 3.5" floppy disks (.img).

Under UNIX/Linux it is recommended that you use the available tool *dd* (syntax: *dd if=filename.img of=/dev/fd0*), just replacing *filename.img* with the name of the according image file.

**Remark:** Note that a floppy disk image always contains the program itself only. Even if you are not using Windows as an operating system, the complete installation package often contains other useful files like a manual for example.

After having built a bootable floppy disk you can start NetSniffer on any PC as described in chapter → 1.4. *Program Start*.

### **2.3.3. Building a Bootable CD**

The image file described in → 2.2.4. *Disk-/ISO-Image & other Operating Systems* can also be used for building bootable CDs. Simply specify this image file as bootable image in your CD recording program. You will possibly have to select the type bootable CD for the recorded CD before. After having built a bootable CD you can start NetSniffer on any PC as described in chapter → 1.4. *Program Start*.

### **2.3.4. Building a CD from an ISO-Image**

If your installation package contains an ISO image (`.iso`), you can use it to create a CD with most CD recording programs. After having finished the recording you have a bootable CD with the corresponding program on it. From this bootable CD you can start NetSniffer on any PC as described in chapter → 1.4. *Program Start*.

## 3. PROGRAM GUIDE

The application interface of NetSniffer consists of the data area, a title bar and a status bar. Pressing the <Esc> key will terminate NetSniffer (→ 3.8. *Leaving the Program*).

### 3.1. Startup Screen

---

After starting the program there are three different possibilities for the appearance of the startup screen. What kind of startup screen is presented by NetSniffer depends on the number of network adapters the program detects:

- **NetSniffer detects *one* network adapter:** The program selects the detected network adapter as the active adapter automatically. After starting the program it displays the data area (→ 3.2. *Data Area*) immediately and the program starts displaying received network packets.
- **NetSniffer detects *several* network adapters:** In this case NetSniffer starts with a small dialog where the detected network adapters are listed. After selecting the desired adapter (→ 3.4.1. *Automatically Detected Adapters*) it is activated and the program starts displaying received network packets.
- **NetSniffer detects *no* network adapters:** NetSniffer starts with a dialog for choosing an adapter manually (→ 3.4.2. *Manual Selection*). If there is an ISA NE2000 adapter available that has not been detected automatically, it is activated after being selected and the program starts displaying received network packets.

As soon as a network adapter has been selected, the data area of NetSniffer is fully visible. NetSniffer displays the MAC address of the selected network adapter in the first line of the data area. This allows to address network packets directly to this adapter (→ 4.1. *MAC Address*).

### 3.2. Data Area

---

The data area extends almost above the whole screen and has a black background. It is limited by the title bar on the top and the status bar on the bottom of the screen. The data area displays the following information:

- **MAC Address:** When selecting a network adapter at program startup (→ 3.1. *Startup Screen*) or when changing the active network adapter (→ 3.4. *Choosing a Network Adapter*) the MAC address of the newly selected adapter is displayed automatically (→ 4.1. *MAC Address*).
- **Network Packets:** The network packets received by NetSniffer are displayed as raw data with some additional information (→ 4.2. *Display of Network Packets*).

---

### 3.3. Status Bar

---

The status bar at the bottom of the screen is divided into four columns. The meaning of these columns is described in the following subchapters.

#### 3.3.1. Hint Field

The left column of the status bar shows hints about the status and for operating NetSniffer.

```
press any key for the next packet | 457 rcvd, 0 lost | R P | F1: Help
```

#### 3.3.2. Packet Counter

The packet counter consists of two individual counters. The counter on the left counts the network packets received (rcvd) that are also displayed. The counter on the right counts lost packets. As NetSniffer has no buffer for packets, it is possible that the time needed for displaying a packet may cause loss of subsequent network packets. Especially if there is much traffic on the network and therefore much data is being displayed this may lead to losing a number of packets. But this is no practical limitation (→ 1.2. *Fields of Use*) as the displayed data is also running so fast in this case that one can only get a glimpse of.

```
press any key for the next packet | 457 rcvd, 0 lost | R P | F1: Help
```

**Remark:** If NetSniffer is *not* in 'Run'-mode (→ 3.5. *'Run'-mode*) and therefore waits for confirmation of each single packet displayed, there may also many network packets be lost. However, the display of lost packets will not be updated until the packet currently displayed is confirmed.

### 3.3.3. Status Field

The status field provides information about the mode NetSniffer is currently working in. The letter *R* stands for 'Run'-mode (→ 3.5. 'Run'-mode), *P* stands for 'Promiscuous'-mode (→ 3.6. 'Promiscuous'-mode). If the particular letter is highlighted in yellow, the respective mode is active.

```
press any key for the next packet | 457 rcvd, 0 lost | R P | F1: Help
```

### 3.3.4. Help

This alludes to the help dialog that can be opened by the <F1> key (→ 3.7. Help).

```
press any key for the next packet | 457 rcvd, 0 lost | R P | F1: Help
```

## 3.4. Choosing a Network Adapter

---

In case of several network adapters, which are supported by NetSniffer being present in a PC, the adapter that is used by NetSniffer can be selected from a list. If NetSniffer detects several supported adapters, a selection dialog with a list of all detected network adapters opens automatically (→ 3.4.1. *Automatically Detected Adapters*). If NetSniffer does not find any network adapters at program startup, the dialog for manual selection is opens automatically (→ 3.4.2. *Manual Selection*).

### 3.4.1. Automatically Detected Adapters

The PCI network adapters supported by NetSniffer are identified automatically. Even for the majority of ISA NE2000 adapters an automatic recognition by NetSniffer is possible. To select the desired adapter, NetSniffer offers an according selection dialog. If NetSniffer recognizes several network adapters, this dialog is already being opened at program startup.

You can also open the selection dialog for the automatically detected network adapters at any time by means of the key <C> (change) and select another adapter.

### **3.4.2. Manual Selection**

NetSniffer is not able to detect ISA NE2000 network adapters in each case automatically. Therefore NetSniffer provides another selection dialog, which offers a list of ISA NE2000 adapters. If you know the respective hardware data of your adapter, you can choose it manually – otherwise you can try each entry from the list. If a list entry is selected and the appropriate adapter does not exist actually it is very likely that NetSniffer simply freezes. In this case you have to restart the program.

You can open this selection dialog at any time by means of the key <M> (manual). NetSniffer opens this dialog automatically at program startup if there has no network adapter been detected automatically.

### **3.5. 'Run'-mode**

---

If NetSniffer is in 'Run'-mode, all received network packets are displayed on the screen immediately. This provides a good overview about the current network traffic and NetSniffer always displays the last network packet received. In case of high network traffic the data displayed runs so fast across the screen that it is barely possible to read the data. In this case it is recommendable to turn off 'Run'-mode. The display then stops after each data packet displayed until you request the next packet. That way you can evaluate the single data packets step by step. However, the subsequent packets that arrive until a key is pressed will be lost in most cases. You can toggle 'Run'-mode by means of the key <R>. As preset, 'Run'-mode is activated at the startup of NetSniffer.

### **3.6. 'Promiscuous'-mode**

---

If NetSniffer is in 'Promiscuous'-mode, all network packets exchanged on the LAN are received and displayed. Normally, NetSniffer receives only the packets that are explicitly addressed to the used network adapter.

As only few network packets are sent directly to the network adapter used by NetSniffer, 'Promiscuous'-mode is automatically activated at program startup. By disabling 'Promiscuous'-mode, NetSniffer is especially suitable for exclusive evaluation of broadcast packets or for development tests where you are able to select the Ethernet ad-



dress (MAC) of the recipient. You can toggle 'Promiscuous'-mode by means of the key <P>.

### **3.7. Help**

---

By using the <F1> key you can open a small help window, which displays the hot keys used in NetSniffer and a short description of their respective function. This allows you to look up the hot key for a desired function without using this manual.

### **3.8. Leaving the Program**

---

To quit NetSniffer press the <Esc> key. Thereupon a dialog window appears. Press the <Esc> key again to return to the program. If you really want to quit the program you can simply turn off the PC at this point or press any key (except <Esc>) to restart the PC. Remind taking the NetSniffer floppy disk or CD-ROM out of the according disk drive in advance as otherwise the program will be started again.

## 4. ADDITIONAL INFORMATION

### 4.1. MAC Address

NetSniffer works machine-intimate and on the lowest possible level (data link layer) to exclude other influences especially when using it for diagnosis and troubleshooting. For this reason NetSniffer does not work on network layer level with the well known IP addresses (e.g. 192.168.0.1) but with the (physical) MAC addresses of the lowest possible level. These addresses consist of six two-digit hexadecimal numbers of the form *00-E0-7D-EC-B6-C7*. While an IP address is assigned dynamically by software, a MAC address is firmly deposited in each network adapter.

AT program startup or when choosing a different network adapter, NetSniffer displays the MAC address of this adapter. When NetSniffer displays a received network packet, the shown sender address is always a MAC address. To find out to which network adapter this MAC address belongs you can either start NetSniffer temporarily on each PC in the LAN and note down the MAC addresses of the network adapters or you try to find out the MAC address by means of the respective operating system. Under Windows 9x you can use the command *winipcfg*, under Windows NT/2000/XP use the command *ipconfig /all*.

### 4.2. Display of Network Packets

NetSniffer displays all received network packets in a unique format. In addition to the user data, there is also some other useful information shown. A data packet is displayed in the following form:

```
1 #: 457
2 Type: 800h (IP)
3 Bytes: 186
4 SRC: 02 90 27 A4 C7 B2
5 DST: 00 00 90 77 EF 4C
6
7 E..JKa@...&n tnyO
  L..6..P.)&c.f...is
  P..fP..HTTP/1.1
  304 Not Modifie
  d..Date: Wed, 24
  $ep 2003 12:06:
  31 GMT..Server:
  Apache/1.3.27 (U
  nix)..Connection
  :close..ETag:
  i4940c9-3234-3f5
  5e0ff.....
```

The individual information fields have the following meaning:

- ❶ **Packet Number ('#')**: All displayed packets are get a unique serial number so that they can be differentiated and to make it possible to determine their relative distance.
- ❷ **Packet Type ('Type')**: This field indicates which protocol type the respective packet is assigned to. The protocol type is displayed as hexadecimal number as well as in clear text (in brackets). The type *LLC* is a special packet type where the number of the protocol type determines the length of the packet.
- ❸ **Size ('Bytes')**: The user data size of the packet is shown here in either case.
- ❹ **Source Address ('SRC')**: Displays the source address (MAC address) of the data packet. This allows to determine its physical origin.
- ❺ **Destination Address ('DST')**: Displays the destination address (MAC address) of the data packet. It should be either a broadcast address or the MAC address of the locally used network adapter.
- ❻ **User Data HEX**: In this area the user data of the network packet is displayed byte-wise in hexadecimal form.
- ❼ **User Data ASCII**: This field also displays the user data of the data packet, but in form of ASCII characters. This makes it far easier to identify character strings in packets, as also shown in the picture above.

## 5. SUPPORTED ADAPTERS

Manufacturer	Chipset	Description	Vendor	Device
<i>all</i>	<b>NE2000</b>	<b>ISA NE2000 Ethernet NIC</b>	<b>N/A</b>	<b>N/A</b>
Realtek Corp.	NE2000	NE2000 compatible Ethernet	10ECh	8029h
Microdyne Corp.	NE2000	NE2000Plus (RT8029) Ethernet Adapter	1266h	1910h
Holtek Inc.	NE2000	LAN Adapter (NE2000-compatible)	12C3h	0058h
"	NE2000	Ethernet Adapter (NE2000-compatible)	12C3h	5598h
Winbond Corp.	NE2000	Ethernet Controller (NE2000 compatible)	1050h	0000h
Surecom Technology	NE2000	Ethernet Adapter (NE2000 PCI clone)	10BDh	0E34h
Texas Microsystems	RT8139C	Realtek 8139C Network Card	1065h	8139h
Realtec Corp.	RT8139A/B/C	Fast Ethernet Adapter	10ECh	8139h
Allied Telesyn Int.	RT8139B	Ethernet Adapter	1259h	2503h
<i>unknown</i>	RTL8139A	10/100 Mbps PCI Fast Ethernet Controller	1500h	1360h
<i>unknown</i>	RTL8139A	10/100 Mbps PCI Fast Ethernet Controller	4033h	1360h
IBM Corp.	i82557B	10/100 PCI Ethernet Adapter	1014h	005Ch
Allied Telesyn Int.	i82557B	AT-2560 Fast Ethernet Adapter	1259h	2560h
Microdyne Corp.	i82557B	NE10/100 Adapter	1266h	0001h
Intel Corp.	i82559	Fast Ethernet PCI/CardBus Controller	8086h	1029h
"	i82559	PCI Networking device	8086h	1030h
"	i82559ER	Fast Ethernet Controller	8086h	1209h
"	i82557/8/9/0/1	Fast Ethernet LAN Controller	8086h	1229h
3Com Corp.	3C900-TPO	Fast Etherlink PCI TPO NIC	10B7h	9000h
"	3C900-COMBO	Fast Etherlink XL PCI Combo NIC	10B7h	9001h
"	3C900B-TPO	EtherLink XL TPO 10Mb	10B7h	9004h
"	3C900B-COMBO	Fast Etherlink 10Mbps Combo NIC	10B7h	9005h
"	3C900B-TPC	EtherLink XL TPC	10B7h	9006h
"	3C900B-FL	EtherLink PCI Fiber NIC	10B7h	900Ah
"	3C905-TX	Fast Etherlink XL PCI 10/100	10B7h	9050h
"	3C905-T4	Fast Etherlink XL 10/100	10B7h	9051h
"	3C905B-TX	Fast Etherlink 10/100 PCI TX NIC	10B7h	9055h
"	3C905B-T4	Fast EtherLink XL 10/100	10B7h	9056h
"	3C905B-FX	Fast EtherLink 100 Fiber NIC	10B7h	905Ah
"	3C905C-TX	Fast EtherLink for PC Management NIC	10B7h	9200h

**Remark:** The data listed above refers to the chipset used in a particular network adapter. For most of the chipsets there exist several different network adapters that incorporate the same chipset. So if your network card is not listed here, the reason is that the list only contains the names of the chipsets. Which chipset a particular network adapter incorporates can be read from the chip on the adapter or found out by its PCI IDs, as described subsequently.

The IDs of your controller can be determined by means of the program **PCISniffer**. Under [www.miray.de/download/sat.pcisniffer.html](http://www.miray.de/download/sat.pcisniffer.html) it is available for free download from the miray homepage. For the PCI SCSI controller in question the fields “Vendor ID” and “Device ID” in PCISniffer have to match the values given above for your SCSI controller.

## **6. TROUBLESHOOTING**

### **6.1. Error #5002 while Loading**

---

If Error #5002 appears when starting the program, start it over again. If this is not successful, build the floppy disk again. If the problem is still there, try another floppy disk or another floppy disk drive, if available.

### **6.2. NetSniffer Gets Stuck at Startup**

---

If NetSniffer begins to start up but gets stuck when scanning for network adapters, the reason is a problem with the adapter recognition in most cases. Try to remove all network adapters from the PC except the one you want to use in this case. If the problem still exists afterwards, exchange the remaining adapter by another one.

If all these steps do not produce relief, this may have to do with the used mainboard. NetSniffer then possibly recognizes wrongfully a pretended ISA NE2000 network adapter and gets stuck while trying to initialize it. Use another PC in this case.

## 7. MISCELLANEOUS

### 7.1. Disclaimer

---

Although NetSniffer was programmed with high diligence and was tested on a large scale of different systems, we hope you understand that we cannot give any warranty for the proper functioning of the program and that we are not liable for damages resulting from its usage, subject to gross negligence and intention.

### 7.2. Feedback

---

We are deeply interested in your feedback. If you encounter any program errors or if you have any suggestions for improvement, we always try to fix the former and to implement respectively to integrate the latter. If you simply want to tell us your opinion about this software, we are looking forward to it.

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