

Napatech

NT Network Adapters with Napatech Driver Software

LibPCAP Installation Guide

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Abstract This document explains how to install the Napatech LibPCAP for the Napatech NT network adapters with Napatech Driver Software and how to configure the adapters when using LibPCAP.

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Modification history

This document has been updated as follows:

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1	2008-11-26	Initial version.
2	2008-12-12	A few minor changes have been made.
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4	2009-04-15	A number of minor changes have been made.
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11	2010-09-24	Changes have been made in Sections 2.1, 2.3, 2.5 and 2.6. Sections 3.4 and 3.5 have been added. Changes have been made in Section 4.2. A number of minor changes have been made.
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Preface

Style conventions

Bold typeface is used for names of, for instance, keys (example: press **Return**). Note that bold typeface is also used in other contexts.

Italics are used for names of directories and paths (example: the */opt/napatech/lib* directory).

Monospaced typeface is used for code (example: `gmake install`).

Abbreviations

This table explains the abbreviations used in this document.

Abbreviation	Explanation
2GD	Second-Generation Driver (Napatech Driver Software)
3GD	Third-Generation Driver (Napatech Software Suite)
ARP	Address Resolution Protocol
BSD	Berkeley Software Distribution
CRC	Cyclic Redundancy Check
DN	Document Number
Fpga, FPGA	Field-Programmable Gate Array
GNU	GNU's Not Unix
HTTP	HyperText Transfer Protocol
HW	HardWare
IFG	Inter-Frame Gap
IPG	Inter-Packet Gap
libpcap, LibP-CAP	Packet CAPture LIBrary
NT	NapaTech
ntpl, Ntpl, NTPL	NapaTech Programming Language
pcap	Packet CAPture
Ref.	REference
Rev.	REvision
STD	STanDard
SW	SoftWare
TX	Transmission/Transmit

References

This table shows the documents that are referenced by this document.

Ref.	Document Title
1	Napatech, NT40E2, NT20E2, NT20E and NT4E Network Adapters with Napatech Driver Software, NTPL Specification, DN-0123
2	Napatech, NT Adapters with Napatech Driver Software, Software Installation Guide for Linux, DN-0128
3	Napatech, NT4E-STD Network Adapters with Napatech Driver Software, NTPL Specification, DN-0139
4	Napatech, NT Network Adapters with Napatech Driver Software, Tools Guide, DN-0159
5	Napatech, NT Network Adapters with Napatech Driver Software, Applications Guide, DN-0160
6	Napatech, NT Adapters with Napatech Driver Software, Software Installation Guide for FreeBSD, DN-0164

1 Introduction

In this document

This document contains information about SW installation related to the Napatech LibPCAP for the NT40E2-1, NT40E2-4, NT20E2, NT20E, NT4E and NT4E-STD adapters with Napatech Driver Software.

Note: Napatech LibPCAP is only supported for feature set N7 or later for capture adapters, feature set N-INL1 or later for NT40E2-4, NT20E2, NT20E and NT4E in-line adapters, and feature set S-INL1 or later for NT4E-STD in-line adapters.

Note: This document refers to functionality provided by Napatech Driver Software (also referred to as 2GD). For users of Napatech Software Suite (also referred to as 3GD), please refer to the appropriate documentation relevant for Napatech Software Suite.

Note: Napatech LibPCAP only applies to Linux and FreeBSD operating systems.

Terminology

In this document the term NT20E does not include NT20E2 adapters, and the term NT4E does not include NT4E-STD adapters.

LibPCAP versions

The Napatech LibPCAP is based on the LibPCAP 0.9.8, 1.1.1, 1.3.0 and 1.4.0 releases.

Filtering

Filtering using **pcap_setfilter** is SW-based and does not utilize the filtering capabilities of the network adapters. Filtering using Napatech LibPCAP with configuration files is HW-based. It is also possible to use **NtplTool** (see [Ref. 4 on page 8](#)) for HW filtering after the driver has been loaded.

Limitations

These limitations exist for Napatech LibPCAP:

- Napatech adapters do not use OS file descriptors to read from. Therefore it is not possible to get a valid OS file descriptor through the **pcap_fileno** function. It always returns the value **-1**. The **pcap_get_selectable_fd** function also returns **-1**.
- The **pcap_set_promisc** function has no effect on Napatech LibPCAP devices. They are always in promiscuous mode.
- Virtual adapters, for instance ntxc0:0, cannot be used simultaneously by different applications.

2 Installing the Napatech LibPCAP

In this chapter

This chapter explains how to install the Napatech LibPCAP.

The chapter contains these sections:

- [“2.1 Preparing the Installation” on page 11](#)
- [“2.2 Installing LibPCAP with Napatech Extensions” on page 12](#)
- [“2.3 Loading the Driver” on page 13](#)
- [“2.4 Installing Tcpdump” on page 14](#)
- [“2.5 Installing Wireshark” on page 16](#)
- [“2.6 Installing Tcpreplay” on page 16](#)

2.1 Preparing the Installation

Prerequisite

It is a prerequisite for installing Napatech LibPCAP that an NT driver package (providing the **ntcommonlib** library), and the Napatech network adapter tools package (see [Ref. 4 on page 8](#)) are installed.

Considerations

During installation the Napatech LibPCAP will be installed in the */opt/napatech/lib* directory. If other LibPCAP libraries are installed on the target platform, it is not certain which LibPCAP library will be used. There are two ways to ensure that the Napatech LibPCAP is used:

- By removing all other LibPCAP libraries from the system
- By forcing the application to use the Napatech LibPCAP library

To force the use of the Napatech LibPCAP library

To force an application to use the Napatech LibPCAP library:

Step	Action
1	<p>Write</p> <pre>LD_PRELOAD=/opt/napatech/lib/libpcap.so <app></pre> <p>or</p> <pre>LD_LIBRARY_PATH=/opt/napatech/lib/ <app></pre> <p>and press Return.</p>

2.2 Installing LibPCAP with Napatech Extensions

To install LibPCAP

To install LibPCAP with Napatech extensions:

Step	Action
1	<p>To extract the standard LibPCAP distribution, write</p> <pre>tar xfz nt_libpcap_0.9.8-x.y.z.tar.gz</pre> <p>or</p> <pre>tar xfz nt_libpcap_1.1.1-x.y.z.tar.gz</pre> <p>or</p> <pre>tar xfz nt_libpcap_1.3.0-x.y.z.tar.gz</pre> <p>or</p> <pre>tar xfz nt_libpcap_1.4.0-x.y.z.tar.gz</pre> <p>and press Return.</p>
2	<p>To enter the LibPCAP library, write</p> <pre>cd libpcap-0.9.8</pre> <p>or</p> <pre>cd libpcap-1.1.1</pre> <p>or</p> <pre>cd libpcap-1.3.0</pre> <p>or</p> <pre>cd libpcap-1.4.0</pre> <p>and press Return.</p>
3	<p>To configure LibPCAP if both Napatech Driver Software (2GD) and Napatech Software Suite (3GD) are to be loaded and supported simultaneously, write</p> <pre>./configure --prefix=/opt/napatech</pre> <p>and press Return.</p> <p>To configure LibPCAP if only Napatech Driver Software (2GD) is to be supported, write</p> <pre>./configure --prefix=/opt/napatech napatech_root=/opt/napatech</pre> <p>and press Return.</p>

Step	Action
4	To install the static library version of LibPCAP, write as root <code>make install</code> (for Linux) or <code>gmake install</code> (for FreeBSD) and press Return .
5	To install the shared library, write as root <code>make install-shared</code> (for Linux) or <code>gmake install-shared</code> (for FreeBSD) and press Return .
6	To update ldd cache, write <code>ldconfig -f /etc/ld.so.conf</code> and press Return .

2.3 Loading the Driver

The `load_driver` script

The driver is loaded using the `/opt/napatech/bin/load_driver.sh` script.

The Napatech LibPCAP works on packet feeds that are specified as NTPL commands (see [Ref. 1 on page 8](#) or [Ref. 3 on page 8](#)) in a configuration file (see [“3 Configuration” on page 19](#)). When the driver is loaded, the script parses the commands from the supplied configuration file.

To load the driver with adapter configuration

To load the driver with the `ntpl_2feeds.cfg` configuration file (see [“Contents of ntpl_2feeds.cfg” on page 21](#)) for the `ntxc0` adapter:

Step	Action
1	For capture adapters, except for NT40E2-1, NT40E2-4 and NT20E2 capture adapters used for transmission, write <code>/opt/napatech/bin/load_driver.sh\ ntxc0=/opt/napatech/config/ntpl_2feeds.cfg</code> and press Return . For in-line adapters, and for NT40E2-1, NT40E2-4 and NT20E2 capture adapters used for transmission, write <code>/opt/napatech/bin/load_driver.sh\ ntxc0=/opt/napatech/config/ntpl_2feeds.cfg PcapTx=1</code> and press Return .

When the driver has been loaded with a configuration file, a number of virtual adapters are created, corresponding to the number of feeds set up. This example creates 2 virtual adapters corresponding to 2 feeds (see [“Output example” on page 15](#)).

2.4 Installing Tcpdump

To install Tcpdump

Tcpdump is prebuilt with static LibPCAP and cannot be used as it is. It must be compiled and installed from source.

To install Tcpdump:

Step	Action
1	<p>To download and extract Tcpdump:</p> <p>a) Write</p> <pre>wget http://www.tcpdump.org/release/tcpdump-4.1.1.tar.gz</pre> <p>and press Return.</p> <p>b) Write</p> <pre>tar xzf tcpdump-4.1.1.tar.gz</pre> <p>and press Return.</p>
2	<p>To configure Tcpdump:</p> <p>a) Write</p> <pre>cd tcpdump-4.1.1</pre> <p>and press Return.</p> <p>b) Write</p> <pre>autoconf</pre> <p>and press Return.</p> <p>c) Write</p> <pre>./configure LDFLAGS="-L/opt/napatech/lib -lntcommonin- terface -lpthread" CFLAGS="-I/opt/napatech/include --pre- fix=/opt/napatech"</pre> <p>and press Return.</p>
3	<p>To build Tcpdump, write</p> <pre>make (for Linux)</pre> <p>or</p> <pre>gmake (for FreeBSD)</pre> <p>and press Return.</p>

Step	Action
4	To install Tcpdump, write as root <code>make install</code> (for Linux) or <code>gmake install</code> (for FreeBSD) and press Return .

Note: Other versions of Tcpdump might work as well.

Note: Depending on the distribution some of the above paths might differ.

To dump the feed information

After the driver load, the feeds are available via LibPCAP. To dump the feed information:

Step	Action
1	To enter the relevant library, write <code>cd /opt/napatech/sbin</code> and press Return .
2	To dump the feed information, write <code>LD_PRELOAD=/opt/napatech/lib/libpcap.so.0.9.8 ./tcpdump -D</code> or <code>LD_PRELOAD=/opt/napatech/lib/libpcap.so.1.1.1 ./tcpdump -D</code> or <code>LD_PRELOAD=/opt/napatech/lib/libpcap.so.1.3.0 ./tcpdump -D</code> or <code>LD_PRELOAD=/opt/napatech/lib/libpcap.so.1.4.0 ./tcpdump -D</code> or <code>LD_LIBRARY_PATH=/opt/napatech/lib ./tcpdump -D</code> and press Return .

Output example

This is an example of an output from Tcpdump:

```
1.eth0
2.any (pseudo-device that captures on all interfaces)
3.lo (local)
4.ntxc0:0 (adapter 0 Feed 0)
5.ntxc0:1 (adapter 0 Feed 1)
```

2.5 Installing Wireshark

Introduction Wireshark uses dynamic LibPCAP libraries, so distribution-specific builds can be used.

To install Wireshark To install Wireshark:

Step	Action
1	Install Wireshark.
2	To run Wireshark with LibPCAP, write: <code>LD_PRELOAD=/opt/napatech/lib/libpcap.so wireshark</code> and press Return .

2.6 Installing Tcpreplay

To install Tcpreplay Tcpreplay uses static LibPCAP and cannot be installed prebuilt. It must be compiled and installed from source.

To install Tcpreplay:

Step	Action
1	To download and extract Tcpreplay: a) Write <code>wget http://dfn.dl.sourceforge.net/sourceforge/tcpreplay/tcpreplay-3.4.4.tar.gz</code> and press Return . b) Write <code>tar xzf tcpreplay-3.4.4.tar.gz</code> and press Return .

Step	Action
2	<p>To configure Tcpreplay:</p> <p>a) Write</p> <pre>cd tcpreplay</pre> <p>and press Return.</p> <p>b) Write</p> <pre>autoconf</pre> <p>and press Return.</p> <p>c) Write</p> <pre>./configure --prefix=/opt/napatech/ --with-libpcap=/opt/napatech/ --enable-dynamic-link --enable-force-inject</pre> <p>and press Return.</p>
3	<p>To build Tcpreplay, write</p> <pre>make (for Linux)</pre> <p>or</p> <pre>gmake (for FreeBSD)</pre> <p>and press Return.</p>
4	<p>To install Tcpreplay, write as root</p> <pre>make install (for Linux)</pre> <p>or</p> <pre>gmake install (for FreeBSD)</pre> <p>and press Return.</p>

Note: Other versions of Tcpreplay may work as well.

Note: Depending on the distribution some of the above paths might differ.

3 Configuration

In this chapter

This chapter explains how to configure Napatech network adapters when using Napatech LibPCAP.

The chapter contains these sections:

- [“3.1 Configuration File Example” on page 19](#)
- [“3.2 Included Configuration Files” on page 20](#)
- [“3.3 Reconfiguration” on page 22](#)
- [“3.4 Performance Configuration” on page 23](#)
- [“3.5 Using Standard PCAP Applications” on page 23](#)

3.1 Configuration File Example

NTPL example

This is an example of an NT configuration file that captures HTTP frames and distributes them to 7 host buffers, and captures ARP frames and distributes them to an 8th host buffer. This is the contents of the file (lines 2 to 8 consists of NTPL commands – see [Ref. 1 on page 8](#)):

```
#=NTPL=#
DefineMacro("mTcpSrcPort", "Data[DynOffset=DynOffTCPFrame;Offset=0;
    DataType=[15:0]]")
DefineMacro("mTcpPort_HTTP", "80")
DeleteFilter = All
SetupPacketFeedEngine [TimeStampFormat = PCAP; DescriptorType = PCAP;
    MaxLatency = 1000; SegmentSize = 4096; NumFeeds = 8]
HashMode = Hash5TupleSorted
PacketFeedCreate [Feed = (0..6); NumSegments = 128]
PacketFeedCreate [Feed = 7; NumSegments = 16]
Capture [Feed = (0..6)] = mTCPSrcPort == mTcpPort_HTTP
Capture [Feed = 7] = Layer3Protocol == ARP
```

Note: This example does not apply to NT4E-STD adapters.

Explanation of the NTPL example

The individual lines in the configuration file in [“NTPL example” on page 19](#) do the following:

1. States that this is an NTPL script.
2. Deletes all previously defined filters.
3. Sets up the adapter to:
 - Use PCAP time stamp format.

Note: When using Napatech LibPCAP, the time stamp format must be `PCAP` or `PCAP_NANOTIME`. LibPCAP cannot inform applications about the actual time format. So any application must be set up to expect, for instance, a PCAP-ns format. As an example, the **Capture** application (see [Ref. 5 on page 8](#)) has the `-nano` parameter for this purpose.

- Use PCAP packet descriptors.

Note: When using Napatech LibPCAP, the packet descriptor type must be `PCAP`.

- Have a maximum latency of 1000 μ s before buffer segments are returned to the driver.
 - Have a segment size of 4 MB.
 - Enable the use of up to 8 feeds.
4. Generates sorted 5-tuple hash keys.
 5. Allocates 128 segments to each of host buffers 0 to 6 giving a total number of 896 (7 x 128) segments.
 6. Allocates 16 segments to host buffer 7.
 7. Captures and distributes all HTTP frames to 7 buffers.
 8. Captures and distributes all ARP frames to one buffer.

When this configuration file is loaded with the driver, eight LibPCAP applications can be started to handle frames from 8 virtual adapter devices: **ntxc0:0** (feed 0), **ntxc0:1** (feed 1), ..., **ntxc0:7** (feed 7).

3.2 Included Configuration Files

Included configuration files

This table describes the configuration files that are included with the driver package:

File name	Applies to	Initial Location	Description
ntpl.cfg	NT40E2-1, NT40E2-4, NT20E2, NT20E, NT4E, NT4E + NTPORT4E and NT4E-STD	<i>/opt/napatech/config</i>	Creates 1 feed to capture all traffic.
ntpl_2feeds.cfg	NT40E2-4, NT20E2, NT20E, NT4E, NT4E + NTPORT4E and NT4E-STD	<i>/opt/napatech/config</i>	Creates 2 feeds – one to capture all traffic from port 0 and one to capture all traffic from port 1.

File name	Applies to	Initial Location	Description
ntpl_4feeds.cfg	NT40E2-4, NT4E, NT4E + NTPORT4E and NT4E-STD	<i>/opt/napatech/config</i>	Creates 4 feeds – one to capture all traffic from port 0, one to capture all traffic from port 1, one to capture all traffic from port 2 and one to capture all traffic from port 3.
ntpl_8feeds.cfg	NT4E + NTPORT4E	<i>/opt/napatech/config</i>	Creates 8 feeds – one to capture all traffic from port 0, one to capture all traffic from port 1, one to capture all traffic from port 2 and so on up to one to capture all traffic from port 7.

Contents of ntpl.cfg

This is the contents of the file:

```
#=NTPL=#

# Delete all filters
DeleteFilter=All

# Create 1 feeds.
SetupPacketFeedEngine[TimeStampFormat=PCAP;DescriptorType=PCAP;
    MaxLatency=1000;SegmentSize=1024;Numfeeds=1]
PacketFeedCreate[NumSegments=16;Feed=0]

# Setup the capture filters
Capture[Feed=0] = All
```

Contents of ntpl_2feeds.cfg

This is the contents of the file:

```
#=NTPL=#

# Delete all filters
DeleteFilter=All

# Create 2 feeds.
SetupPacketFeedEngine[TimeStampFormat=PCAP;DescriptorType=PCAP;
    MaxLatency=1000;SegmentSize=1024;Numfeeds=2]
PacketFeedCreate[NumSegments=16;Feed=(0..1)]

# Setup the capture filters
Capture[Feed=0] = Channel==0
Capture[Feed=1] = Channel==1
```

Contents of ntpl_4feeds.cfg

This is the contents of the file:

```
#=NTPL=#

# Delete all filters
```

```

DeleteFilter=All

# Create 4 feeds.
SetupPacketFeedEngine[TimeStampFormat=PCAP;DescriptorType=PCAP;
    MaxLatency=1000;SegmentSize=1024;Numfeeds=4]
PacketFeedCreate[NumSegments=16;Feed=(0..3)]

# Setup the capture filters
Capture[Feed=0] = Channel==0
Capture[Feed=1] = Channel==1
Capture[Feed=2] = Channel==2
Capture[Feed=3] = Channel==3

```

Contents of ntpl_8feeds.cfg

This is the contents of the file:

```

#=NTPL=#

# Delete all filters
DeleteFilter=All

# Create 8 feeds.
SetupPacketFeedEngine[TimeStampFormat=PCAP;DescriptorType=PCAP;
    MaxLatency=1000;SegmentSize=1024;Numfeeds=8]
PacketFeedCreate[NumSegments=16;Feed=(0..7)]

# Setup the capture filters
Capture[Feed=0] = Channel==0
Capture[Feed=1] = Channel==1
Capture[Feed=2] = Channel==2
Capture[Feed=3] = Channel==3
Capture[Feed=4] = Channel==4
Capture[Feed=5] = Channel==5
Capture[Feed=6] = Channel==6
Capture[Feed=7] = Channel==7

```

3.3 Reconfiguration

Recommendation

To reconfigure the number of feeds when using Napatech LibPCAP, it is recommended to reload the driver with a new configuration file. However, some NTPL commands (see [Ref. 1 on page 8](#) or [Ref. 3 on page 8](#)) can be issued after load of the driver.

Allowed NTPL commands

All `Capture[]` NTPL commands are possible after the driver is loaded.

Note: The NTPL command, `DeleteFilter=ALL`, will destroy all `Capture[]` commands and leave the system in a state where feeds are created but not configured, and no frames will be received until a new `Capture[]` command has been issued.

3.4 Performance Configuration

To change the TX segment time-out

To change the time-out value for TX segments:

Step	Action
1	Activate <code>#define TX_SEGMENT_TIMEOUT_MICROSEC 10000</code> in the <code>pcap-napatech-intl.h</code> file and set the number of microseconds appropriately.
2	Reinstall Napatech LibPCAP.

To transmit frames as fast as possible

To change the TX configuration to transmit frames as fast as possible instead of maintaining the IFG (inter-frame gap):

Step	Action
1	Deactivate <code>#define USE_FUNCTION_CALL_IPG</code> in the <code>pcap-napatech-intl.h</code> file.
2	Reinstall Napatech LibPCAP.

3.5 Using Standard PCAP Applications

To capture frames without CRC

Standard PCAP applications expect frames without CRC. By default NT adapters deliver frames with CRC. To change the configuration to ensure that the wire length is without CRC:

Step	Action
1	Activate <code>#define CAPTURE_WITHOUT_CRC</code> in the <code>pcap-napatech-intl.h</code> file.
2	Reinstall Napatech LibPCAP.

4 Troubleshooting

In this chapter

This chapter gives some troubleshooting guidelines.

To perform troubleshooting

To perform troubleshooting in case of problems:

Note: This must not be done if the driver was compiled with the **compact_pcap** install parameter (see [Ref. 2 on page 8](#) or [Ref. 6 on page 8](#)).

Step	Action
1	Activate <code>#define NAPATECH_DEBUG</code> and <code>#define NAPATECH_CALL_TRACE</code> in the pcap-napatech-intl.h file.
2	Reinstall Napatech LibPCAP.
3	Look in syslog for the debug output.

Error codes

This table explains two error codes that might occur in special situations:

Situation	Error Code	Explanation	Solution
After running <code>./configure</code>	>>Syntax error: "fi" unexpected (expecting ")")<< or similar	Your configure shell script must be recreated. GNU AutoConf 2.59 - 2.62 is supported.	Run <code>autoconf</code>
After running <code>make</code> or <code>gmake</code>	>>gcc: @NAPATECH_LIBS@: No such file or directory<< or similar	The make file you are using has not been fused by configure on your platform.	Run <code>./configure</code>

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