



Installation Guide

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1. Introduction

1.1 What is (X)Net ?

This new packet radio Digipeater software offers new capabilities and performance. (X)NET is a AX25-Multiprotocol-Routing-Software for packet radio. It serves simultaneous:

- INP3 the optimized NET-ROM routing Protocol
- NET-ROM
- FlexNet routing Protocol
- TCP/IP Router and SLIP Interface

Therefore (X)net will be the most adaptive and flexible Packet Radio System, with Interfaces to all major Routing algorithms. This flexibility will surely cause enthusiasm with the connoisseurs.

X)NET is designed from the beginning on optimal performance. It gets out the best for each platform it runs. Data Rates up to 1,5 MBit/s per Channel can be achieved with a commercial TNC3. Try out!

1.2 General

This file was created to guide the Sysop during first installation of (X)Net Systems. Each chapter will reflect the different Hardware-Platforms with their possibilities. For details to the various commands, the (X)Net manual is recommended.

Comments and improvements are welcome and will be integrated into the next release of this document.

On the Internet the official (X)Net Homepage at <http://www.swiss-artg.ch> is available. On this site, all official software releases and documentations are available for Download.

Jimmy DL1GJI runs a FAQ List on <http://www.qsl.net/dl1gji> where the most interesting Questions and their Answers are available.

We try to answer all Questions about (X)Net (so far as they are not mentioned in the (X)Net Manual or the official FAQ List).

Since July 1998 we also have a Mailing List Server.

To subscribe, send an e-mail to listporoc@ham.ireste.fr with NO Subject and the following message Body:

subscribe xnetlist First_Name Name (Callsign)

Within few minutes you'll receive an acknowledgement from the listprocessor, telling you are now member of xnetlist.

To write in the mail-list, simply e-mail xnetlist@ham.ireste.fr, your mail will be distributed to all readers. Many thanks to Eric F5PJE to obtain this Service to the Ham Community!

In case of serious troubles contact HB9PAE @ HB9OS via Packet-Radio or by e-mail hb9pae@swissonline.ch.

1.3 (X)net Hardware Requirements

PCNET16	IMB Compatible PC, 286 CPU Operating System DOS recommended 1 MB Memory
PCNET32	IMB Compatible PC, 386 CPU Operating System DOS recommended 8 MB Memory
NTNET	IMB Compatible PC, min 486 CPU Operating System Windows NT or Windows95 min 8 MB Memory
STNET	Atari ST min. 1040 ST
3NET	TNC3 with 286K RAM, 1 MB recommended
LINUXNET	IMB Compatible PC, 386 CPU Linux-Kernel Version 2.0, 16 MB Memory recommended

1.4 Hardware and Operating Systems

For best performance we recommend the TNC3S Hardware. This Hardware was developed to obtain maximum Line Operating System. For PC based systems (with or without TCP/IP) the Linux Version Linu(X)Net gives you the best performance. For a small system (up to 4 AX25 Ports) PCNET 16 Bit DOS Version will be sufficient, but due to the limited memory capacity under DOS, you will not have all features available.

1.5 Interfaces

Serial drivers

Driver	PCNet16	PCNet32	NTNet	LinuxNet	STNet	3Net
KISS	X	X	X	X	X	X
SMACK	X	X	X	X	X	X
RMNC	X	X	X	X	X	X
Token ring	X	X	X	X	X	X
Token ring w. CRC	X	X	X	X	X	X
SLIP	X	X	X	X	X	X
High speed bus	-	-	-	-	-	X

AX25 driver (special hardware)

Driver	PCNET16	PCNet	NTNet	LinuxNet	STNet	3Net
VANESSA	X	X	-	X	-	-
TNC3-SCC	-	-	-	-	-	X
USCC (Baycom)	-	-	-	X	-	-
OptoSCC (PA0HZP)	-	-	-	X	-	-
HSKSCC (DLYDN)	-	-	-	X	-	-

Availability of background processes

Process	PCNet16	PCNet32	NTNet	LinuxNet	STNet	3Net
Monitor	-	X	X	X	X	X
Statistics	-	X	X	X	X	X
Cron job	-	X	X	X	X	X
IP Router	-	X	X	X	X	X
Convers	-	X	X	X	X	X
Beacon	-	X	X	X	X	X
Packet FTP	-	X	X	X	X	X

2. Installation of (X)Net

2.1 General

Copy the (X)Net executable file into the desired Subdirectory. The Files C.TXT and D.TXT will be transmitted with every Connect resp. Disconnect of a USER. Any Help Files are read when the User submits a **HELP NAME** command, create those Files and name it NAME.INF.

2.2 Connect to the Node

TNC3S

Connect a ASCII Terminal to the RS232 Connector, set DIP Switch 1 and 8 to the UPPER position (19200 Baud, no Parity, Terminal Mode) and apply Power to the TNC.

PC Version

Start your favorite (X)Net Version at the command prompt.

After startup of (X)Net, you will receive at the Sysop Console the (X)Net Login screen telling you the running Program Version and the Node Call. If there are Modems connected to the SCC (TNC3 only) they will be recognized and displayed in the login screen. The Node Callsign will be used to login to the (X)Net Node. (X)Net is looking now for a file AUTOEXEC.NET and will execute any command. This is the way to have a individual configuration in unattended mode.

Now you are ready to connect to the Node using the command "**ESC C Callsign**". The default Call will be NOCALL the ALIAS is #####.

Get SYSOP with the CMD **SYS**, no password is required on the Terminal Port. You are ready to assign the Drivers to the Ports.

2.3 Port allocation and configuration

The Port allocation command should be stored into the File **AUTOEXEC.NET**. Copy a file with the desired configuration into the (X)Net Subdirectory. For tests, the assign command can be executed also manually from sysop, but the assign have to be repeated after every restart.

TNC3S

The TNC3S has 3 SCC Channels, SCC1 and 2 are assigned to the AX25 Ports (modems), SCC 3 is assigned to the RS232 Terminal port. During initialization of (X)Net, the Modems are recognized and displayed. Define now the required Parameters like TXDelay, Port Name and Port Speed. All Port Commands are available with:

Port X Parameter Value e.g: Port 2 Name HUGO

For special cases, the SCC 1-3 can be assigned to any Interface driver. Edit a file AUTOEXEC.NET and copy it to the TNC3S RAM using the Program RS.EXE
Sample of AUTOEXEC.NET, uncomment the desired Line:

```
# AUTOEXEC.NET for TNC3S
#
# REM Attach SCC3 to KISS Mode on Port 2, using 1 Channel, 115200 Baud
# att scc3 kiss 2 1 115200
# REM Attach SCC3 to SMACK Mode on Port 2, using 1 Channel, 115200 Baud
# att scc3 smack 2 1 115200
# REM Attach SCC3 to Tokenring-Kiss on Port 2, using 1 Channel, 115200 Baud
# att scc3 TRKISS 2 1 115200
```

PC Version

All serial devices within COM 1 – 8 or up to 8 VANESSA Card's (16 Ports) can be used to interface the (X)Net Node to an external Hardware.

Sample of AUTOEXEC.NET, uncomment the desired Lines:

```
# AUTOEXEC.NET for PCNET (16/32 Bit)
# REM COM 1 to KISS Mode on Port 0, using 1 Channel, 38400 Baud, IRQ3, ADR 2F8
# att com1 kiss 0 1 38400 3 2F8
# REM COM2 to SMACK Mode on Port 1, using 1 Channel, 19200 Baud IRQ4, ADR 3F8
# att com2 smack 1 1 19200 4 3F8
# REM COM3 to RMNC-KISS on Port 2, 1200 Baud, IRQ7 ADR 555
# att com3 rmnc 2 1 1200 7 555
# REM VANESSA on Port 2,
# att VANESSA AX25 2
```

Copy the File into the (X)Net subdirectory and restart (X)Net (ESC QUIT). The Login screen will display the assigned Interface Drivers. Define now the required Parameters like TXDelay, Port Name and Port Speed. The Port Parameters will be stored after 10 Minutes, make sure not to quit (X)net before. All Port Commands are available with:

Port No Parameter Value e.g: Port 5 Baud 19200

Linux Version

All character devices in the subdirectory /dev /.... or up to 8 VANESSA Card's(16 Ports) can be used to interface the (X)Net Node to an external Hardware.

Sample of AUTOEXEC.NET, uncomment the desired Lines:

```
# AUTOEXEC.NET for LINUXNET (Filename upper case !)
#
# REM ttyS0 (COM 1) to KISS Mode on Port 0, using 1 Channel, 38400 Baud
# att sdev0 kiss 0 1 38400 /dev/ttyS0
# REM ttyS1 (COM2) to SMACK Mode on Port 1, using 1 Channel, 19200 Baud
# att sdev1 smack 1 1 19200 /dev/ttyS1
# REM sdev2 (COM3) to RMNC-KISS on Port 2, 1200 Baud
# att com3 rmnc 2 1 1200 /dev/ttyS2
# REM VANESSA on Port 2,
# att VANESSA AX25 2
```

Copy the File into the (X)Net subdirectory and restart (X)Net (ESC QUIT). The Login screen will display the assigned Interface Drivers. Define now the required Parameters like TXDelay (in milli seconds e.g. 300 !), Port Name and Port Speed. The Port Parameters will be stored after 10 Minutes, make sure not to quit (X)net before. All Port Commands are available with:

Port X Parameter Value e.g: Port 5 Baud 19200

2.4 MYCALL

After Connect to (X)Net and sysop privilege set the MYCALL of the Node executing the command:

MY CALL YOUR_CALL

and set the ALIAS with

MY ALIAS YOUR_ALIAS

After 10 Minutes, (X)Net will store his Nodecall and ALIAS into the configuration File and read it after restart.

2.5 AX25 Neighbor Configuration

To define the Protocol to the Neighbors Digipeater, the command **Router** is available. This Configuration is stored into (X)Net's configuration File after 10 Minutes.

INP3 Protocol:

Execute **Router BC Add Port_No CALL [via Call]** for all Neighbors

NET-ROM Protocol:

Execute **Router BC Add Port_No Call [via Call]** for all Neighbors

FlexNet Protocol:

Set the own upper SSID with **Router FlexNet Param SSID 0..15**

Execute **Route FlexNet Add Port_No Call [via Call]** for all Neighbors

Local Neighbor

Local entries are used to bind any other Stations to the Net. (X)Net remembers local Neighbors in his Router Table, the Parameter ND is defining the way, this callsign will be distributed to the community. N means distribute it to the NET-ROM Neighbours (Node Table), D means distribute it to the FlexNet Neighbours (Destination Table). For the NET-ROM Table, a ALIAS can be defined.

Execute **Route Local AddPort_No Call N|D|ND ALIAS**

2.6 Ping-Pong Convers

The Convers daemon is available for TNC3S, PCNET32 NTNet and Linux Versions only. To start the daemon add the following command to the AUTOEXEC.NET file:

START CONVERSD CONVERS_CALL

To add a Convers-Link, go in convers mode with **CONV** and submit **/L CALL Port_No**. The Port Number is only needed in case of a pure AX25 Link (L2 Link), (X)Net is using a Net-Rom Circuit instead. Take note, that the Ping Pong Convers is not able to handle Loops, so be careful with configuration. One of the Partners should not be active, use Port 254 on this side to avoid double Links. In the Convers mode. Help can be obtained with **/H**. The Help-File is conversd.xhf (lower case under Linux!).

2.7 IP Router

The IP Router daemon is available for TNC3S, PCNET32 NTNet and Linux Versions only. To start the daemon add the following command to the AUTOEXEC.NET file:

START ROUTED

Now, the commands ARP, IPR, PING and GETIP are available. GETIP submits a temporary IP-Nummer (DHCP protocol). PING xxx (where xxx is the destination IP-Number) is used to test a IP-Route out from (X)Net command prompt. (X)net will then display the measured round trip time (RTT) to the pinged destination. The temporary IP-Numbers are taken out from the file IPADDR.NET.

To attach a SLIP-Driver add to the AUTOEXEC.NET:

TNC3S: attach SCC3 slip 38400
PCNET32: attach COM1 slip 38400
LINUX: attach SDEV2 slip 38400 /dev/ttyrf

During startup, the IP Router reads the File **IP.NET**, this file contains the default entries in the ARP or IPROUT List. Add the default entries into the File IP.NET:

Sample of IP.NET:

```
# IP.NET (Linux:Filename upper case !)  
# (X)Net IP Adress  
myip 44.142.155.65  
# ARP entry for all received IP Frames  
arp add 44.142.155.66 SLIP SCC3  
# HB9AK is available under 44.142.155.166 via AX25  
arp add 44.142.155.166 AX25 HB9AK  
# IPR route all IP-Frames with 44.142.64.xx via NETROM to 44.142.155.66  
ipr add 44.142.64.0/24 NETROM 44.142.155.66
```

The (X)Net IP-Router will respond to his IP-Number (MYIP), so testing of routes ist easy possible. The ARP Table (ARP List) will display the number of received or transmitted IP Frames on the various interfaces.

2.8 Beacon Daemon

To activate the beacon deamon add the following command to AUTOEXEC.NET:

```
START BEACOND
```

A beacon can be programmed with:

```
"BEACON ADD intervall [sec] port_no destination_call TEXT your_text" eg:  
"BEACON ADD 300 0 QST TEXT This is a Test Beacon"
```

2.9 Statistic Daemon

To activate the statistic daemon add the following command to AUTOEXEC.NET:

```
START STATD intervall [sec] file_name
```

(X)Net will then save the binary data for each port into the file (get the actual data online with S PO). The Sysop can readout the binary File using "R BIN file_name.sta" and convert the data into ASCII using the DOS Program POSTAT.EXE giving the Port Number as argument. It is possible to import the ASCII Data into EXCEL and generate a diagram. Read the documentation of POSTAT.EXE to get more details.

2.10 Packet File Transfer Program (PFTP)

PFTP is used to send files or random data over any AX25 Link. Random data are used to verify the maximum link transfer rate.

Enter into the program with "**PFTP destination_call**". After connection to the destination, you can execute a remote command to the destination with "**Q**" and send a file with "**PUT file_name**".

Random data can be generated by the command "**T no_of_bytes**". To verify the link capacity, select the null device at the PFTP destination (XNET only) with "**Q NULL**", the receiver will throw away now the received data. At end of transmission a statistic will be displaed.

3. Startup Script Files

TNC3S

No startup script is needed, the setting of the DIP Switches 4 to 8 will start the desired configuration for SCC 1 to 3. See the manual for detailed description.

PC Version (DOS)

The following Batchfile starts (X)Net. To have a unattended Station, this script shall be called by AUTOEXEC.BAT:

```
REM (X)Net Startup File XNET.BAT
REM Start (X)Net
CD C:\XNET
CALL PCNET.EXE
CALL TEST.EXE
XNET.BAT
```

The second call of TEST.EXE to start an alternative Version of (X)Net. In case of future program updates, the Sysop loads the new Version using the command **LOAD TEST.EXE** and starts an Auto-Bin Transfer to load a new Version. After successful upload, he exits the running Program by **PRGEXIT**, the Batchfile will start TEST.EXE. In case of troubles, a RESET (manually or by a watchdog circuit) will start the previous Version again. Later on the Sysop can copy the new Program File to PCNET.EXE.

Linux Version

This script file will be called after Linux-startup.

```
# file xnet-run
#!/bin/sh
#
# xnet-run: Script to start / restart (X)net after boot or failure
#
trap "" 1
cd /xnet
while [ "true" ]
do
    sleep 10
    echo `date` "(X)net start" >> xnet.log
    ./linuxnet < /dev/tty8 > /dev/tty8 2>&1      # use console 8 for (X)Net
    exitstatus=$?
    echo `date` "(X)Net exit status" $exitstatus >> xnet.log
    sleep 10
    echo `date` "(X)net Test start" >> xnet.log
    ./linuxnet.alt < /dev/tty8 > /dev/tty8 2>&1
    exitstatus=$?
    echo `date` "(X)Net Test exit status" $exitstatus >> xnet.log
done
```

4. In case of Problems

In case of Problems read the Manual again and again.

For serious failures, the File **NETROM.LOG** will have an entry. Read out the File with **READ NETROM.LOG**. The online Log will also submit hints to the Sysop. Switch on this feature with the command **LOG**, you will receive all system warnings and errors.