DIL/NetPC DNP/1110
Starter Kit

User Manual

Contents

1. Introduction

This document describes how to get started with the DNP/1110 Starter Kit. For further information about the individual components of this Starter Kit you may follow the links from our website at: *http://www.dilnetpc.com*

Our Website contains a lot of technical information, which will be updated in regular periods.

For further technical information – like hardware description etc. – please check out the DIL/NetPC Starter Kit CD-ROM, which is included in every Starter Kit.

1.1 Conventions used in this Document

Convention	Usage
italic	Filenames, as well as Internet addresses such as www.ssv-embedded.de
italic	User inputs, command lines and pathnames
bold	New terms
`monospace text`	Program code

Table 1: Convention usage

1.2 Main Features

Evaluation Board DNP/EVA2 (Special Version)

- DIL-64 Socket for one DIL/NetPC DNP/1110
- RS232 Serial Interface (COM1)
- 10BASE-T/100BASE-TX Ethernet Interface
- 8 User-Definable LEDs
- 8 Manual DIP Switches
- 1 Reset Switch
- Wire-Wrap-Area
- 5VDC Power Input Connector
- Null-Modemcable
- Size 142 x 124 mm

DIL/NetPC DNP/1110

- Intel StrongARM SA-1110 CPU with 206 MHz Clock Speed.
- 32 MByte SDRAM Memory, 16 MByte FLASH Memory
- 10/100 Mbps Ethernet Interface
- Two 16550 Serial Ports (one with all Handshakes)
- 20-bit General Purpose high-speed Parallel I/O
- 8-bit I/O Expansion Bus
- 5 Interrupt Inputs, 4 Chip Select Outputs
- Programmable Watchdog Timer
- JTAG IEEE 1149.1 Test Interface
- In-System Programming Features
- 64-pin JEDEC DIL-64 Connector, 2.54mm Centers
- 3.3 Volt Low Power Design, Supply Voltage 3.3 VDC (+- 5%)
- Supply Current 300 mA typ. at 206 MHz
- Size 82mm x 28mm

2. Board Layout

The base component of the Starter Kit is the Evaluation Board DNP/EVA2. On this board you will find a DIL-64 socket (DIL = Dual In Line) to mount your DNP/1110.

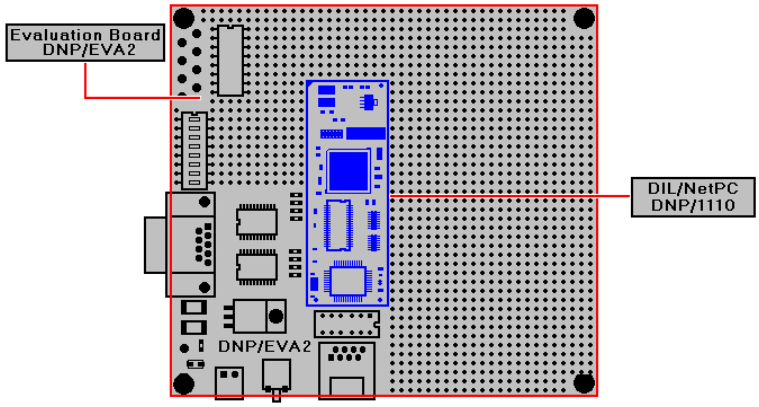


Figure 1: Evaluation Board DNP/EVA2 with DNP/1110

The Starter Kit provides all required basic hard- and software environment, which allow you the development of individual applications for your DNP/1110. For an instant connection to your hardware the Evaluation Board supports a serial COM1 interface, a 10Base-T Ethernet interface as well as a DIL-64 (DIL =Dual In Line) interface. Further you will find a Prototype (wire-wrap) area, 8 LEDs, 8 DIP switches and one reset switch, which allows you to test your peripheral applications very easy. The figure 2 shows the base components of the Evaluation Board.

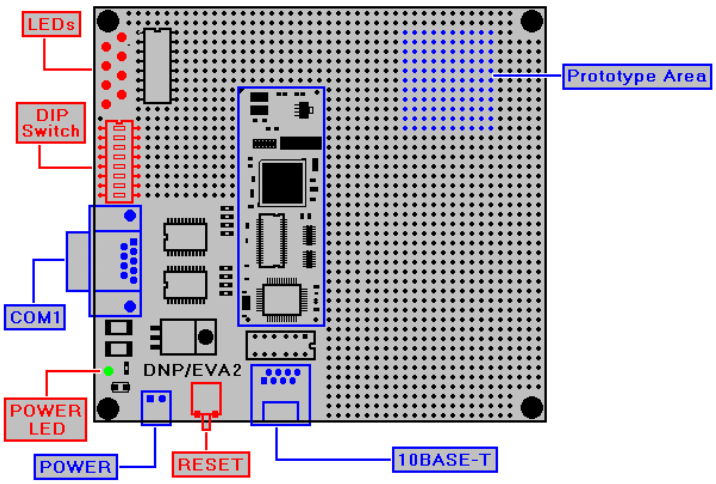


Figure 2: Components of the Evaluation Board DNP/EVA2

3. Board Components

This chapter describes the most interesting components of the Evaluation Board DNP/EVA2 and gives a short overview about their respective functions.

3.1 Power LED

The Evaluation Board DNP/EVA2 is equipped with a single green LED. This LED will light up when the Board is provided with the necessary operating voltage.

3.2 Output LEDs

The Evaluation Board provides eight LEDs for testing purposes. These LEDs will flicker or light up to indicate traffic on the output ports PA0–PA7.

3.3 DIP Switches

The Evaluation Board has a set of eight DIP-switches that give you the possibility to control the input ports PB0–PB7.

Switch open – Signal V_{in} Low (GND)
Switch closed – Signal V_{in} High (V_{cc})

3.4 Serial Interface COM1

For an easy connection between the Starter Kit and your development system you can use the serial interface on the Evaluation Bord. A RS232 standard compliant Sub-D port with 9 pins realizes this interface. The exact layout is shown on table 2.

Pin	Signal
1	DCD
2	RxD
3	TxD
4	DTR
5	GND

Pin	Signal
6	DSR
7	RTS
8	CTS
9	RI

Table 2: Pinout COM1

3.5 10Base-T Ethernet Interface

The DNP/1110 is using a SMSC LAN91C111 chip that allows Ethernet connectivity with a speed up to 100Mbps. The RJ45 Ethernet interface on the Evaluation Board is just a simple connection over a transformer to the DIL-64 interface pins, which are connected to the SMSC LAN controller on the DNP/1110.

3.6 RCM Jumper

Use this jumper to activate the RCM mode of the DNP/1110. The RCM mode (Remote Console Mode) offers the possibility to control the PNP/1110 via terminal program. To activate the RCM mode place a jumper cap on both pins of the RCM jumper, so that it is short. If you remove the jumper cap, or place the jumper cap on just one pin, the jumper is open and you are not able to use the RCM mode.
When closed you will see some boot messages on the serial port COM1. If the RCM jumper is open, these messages are blocked. Figure 3 shows the exact position of the RCM jumper onto the DNP/1110.

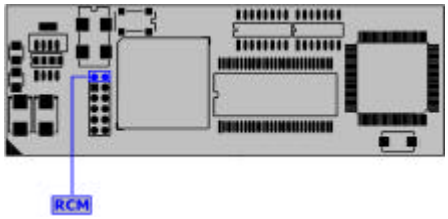


Figure 3: RCM Jumper

3.7 DIL-64 Interface

The Evaluation Board DNP/EVA2 provides a DIL-64 interface for mounting the DNP/1110. The table 3 shows the signals connected to the DIL-64 interface.

Pin	Name	Usage	Pin	Name	Usage
1	PA0	YES, LED	33	RX+	YES
2	PA1	YES, LED	34	RX-	YES
3	PA2	YES, LED	35	RESOUT#	NO
4	PA3	YES, LED	36	VBAT	NO
5	PA4	YES, LED	37	CLKOUT	NO
6	PA5	YES, LED	38	TXD2	NO
7	PA6	YES, LED	39	RXD2	NO
8	PA7	YES, LED	40	INT5	NO
9	PB0	YES, DIP-Switch	41	INT4	NO
10	PB1	YES, DIP-Switch	42	INT3	NO
11	PB2	YES, DIP-Switch	43	INT2	NO
12	PB3	YES, DIP-Switch	44	INT1	NO

13	PB4	YES, DIP-Switch	45	CS4#	NO
14	PB5	YES, DIP-Switch	46	CS3#	NO
15	PB6	YES, DIP-Switch	47	CS2#	NO
16	PB7	YES, DIP-Switch	48	CS1#	NO
17	PC0	NO	49	RDY	NO
18	PC1	NO	50	RD#	NO
19	PC2	NO	51	WR#	NO
20	PC3	NO	52	SA3	NO
21	RXD1	YES	53	SA2	NO
22	TXD1	YES	54	SA1	NO
23	CTS1	YES	55	SA0	NO
24	RTS1	YES	56	SD7	NO
25	DCD1	YES	57	SD6	NO
26	DSR1	YES	58	SD5	NO
27	DTR1	YES	59	SD4	NO
28	RI1	YES	60	SD3	NO
29	RESIN	YES	61	SD2	NO
30	TX+	YES	62	SD1	NO
31	TX-	YES	63	SD0	NO
32	GND	YES	64	VCC	YES

Table 3: Signals connected to the DNP/EVA2 DIL-64 Interface

4. Mounting the DIL/NetPC

To mount the DNP/1110 on the Evaluation Board DNP/EVA2 set it carefully on the DIL-64 interface onto the Evaluation Board. Please note, that the DNP/1110 is positioned in the right way like shown in figure 4. After that, push the DNP/1110 down, so that the DIL-64 socket fixes it.

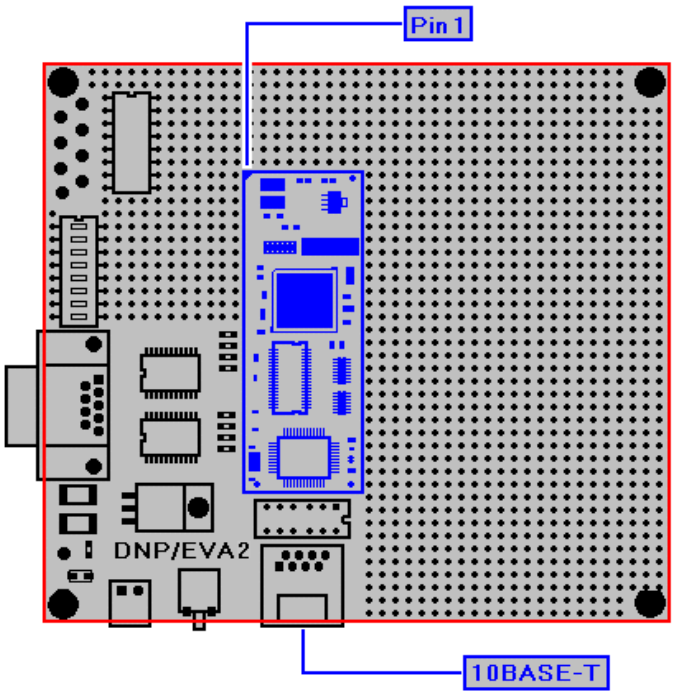
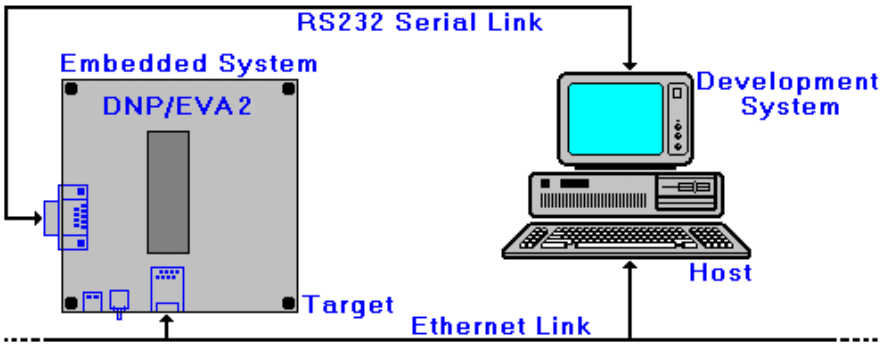


Figure 4: Position of the DIL/NetPC on the Evaluation Board

5. Cable Connections

Before installing the necessary cable connections you should check the correct setting of the RCM jumper onto the PNP/1110 (see chapter 3.6). Normally this jumper is set by default. Before you can use your DIL/NetPC Starter Kit you need a further Desktop- or Notebook-PC that act as development system. This development system should run under MS-Windows or Linux in an ideal manner. This computer will act as your development system. Between the development system and the Starter Kit are two new connections required. At first the **RS232 Serial Link** and second the **Ethernet Link**. The PC will act as development system



and as **Remote Console Monitor (RCM)** for the DNP/1110 on the Evaluation Board. Please make sure, that the RCM jumper on the DNP/1110 is set correctly.

Figure 5: Overview about the required cable Connections

5.1 Serial Link

For the Serial Link, you need a Null-Modemcable. This cable comes along with your Starter Kit. Please connect the Evaluation Board with a COM port of your development system (for example COM1 or COM2) by using this cable.

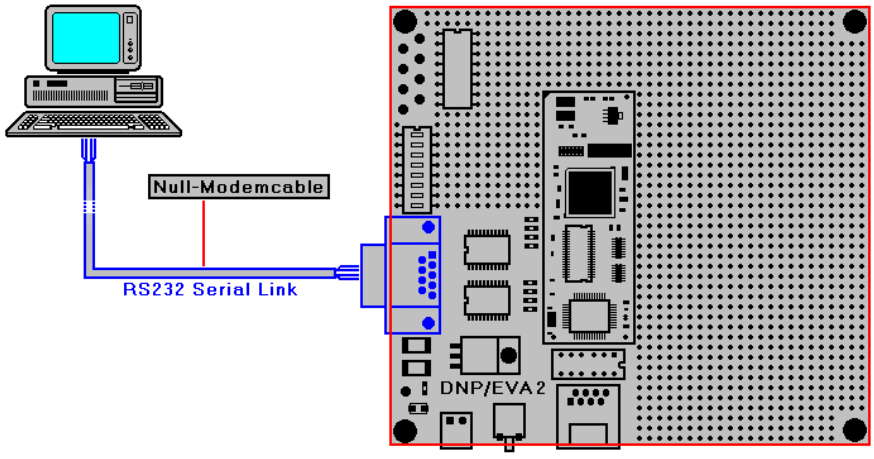


Figure 6: Serial Link Connection

5.2 Ethernet Link

The Ethernet Link requires two standard 10Base-T patch cables, one Hub or Switch and an Ethernet-LAN interface for your development system.

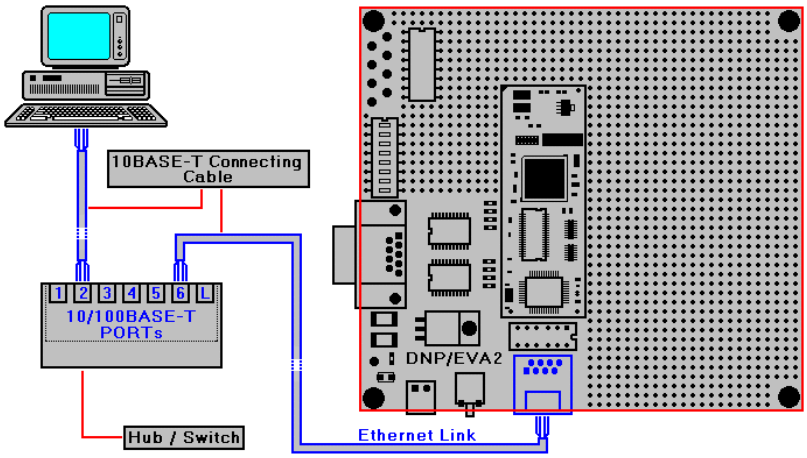


Figure 7: Ethernet Link Connection

5.3 Power Supply

The DNP/1110 Starter Kit needs a supply voltage of 5VDC to work. In your Starter Kit package you will find a plug-in power supply unit to provide the system with the necessary power.

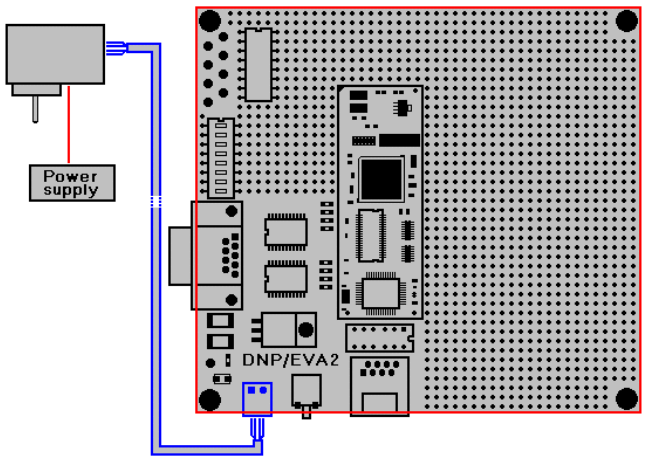


Figure 8: Power supply Connection

After the successful connection of all cables between the Evaluation Board and your development system, the Starter Kit is ready to run.

6. First Steps

You can use the DNP/1110 Starter Kit from your development system. This development system may run under different operating systems. The first steps for getting started we will describe exemplary by the two most popular operating systems – MS-Windows and Linux.

6.1 Using a Windows–based development System

The following paragraphs will help you to use the DNP/1110 with a development system running under MS-Windows. For these steps some programs are necessary, which normally come along with every MS-Windows installation (e.g. HyperTerminal). Please make sure that these programs are present on your development system. If these programs are not installed at your development system – you have to install these programs manually from your MS-Windows installation CD.

6.1.1 Setup the Serial Link

Before you provide the Evaluation Board with power for the first time, please run a terminal program – for example Windows HyperTerminal – that offers communication capabilities on your development system. In the following you will see the necessary settings for HyperTerminal under Windows. Select the "direct link cable connection via COM1" interface in the property sheet and choose "Configure".

Figure 9: Interface property Sheet

Now you can change some configuration parameters – such as the maximum baud rate – on a further property sheet. Select the value "115.200" in the "Bits per Second" field and close the property sheet by clicking the "OK" button, like shown in figure 10.

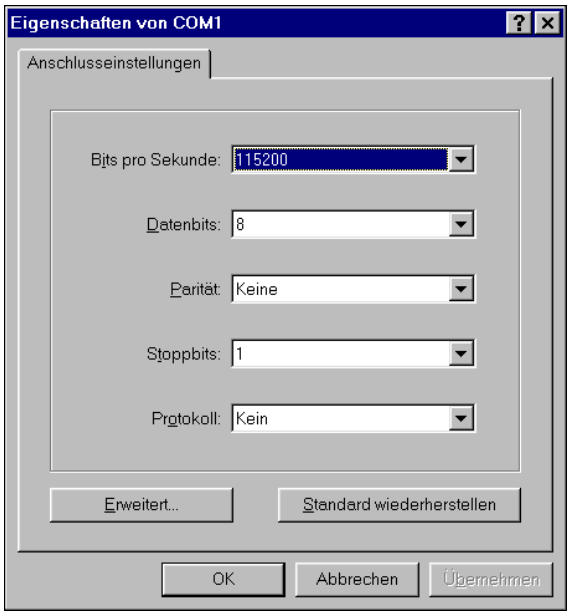


Figure 10: Baud rate Settings

All these settings can also be used for other terminal programs. The following parameters are important to use:

- Connection Speed 115.200 bps (Bits per Second)
- 8 Data bits
- No Parity bit
- 1 Stop bit
- No Protocol (Xon/Xoff, RTS/CTS or similar).

Now turn on the power for the Evaluation Board and you will see all steps of the DNP/1110 boot process in the terminal program window at your PC.

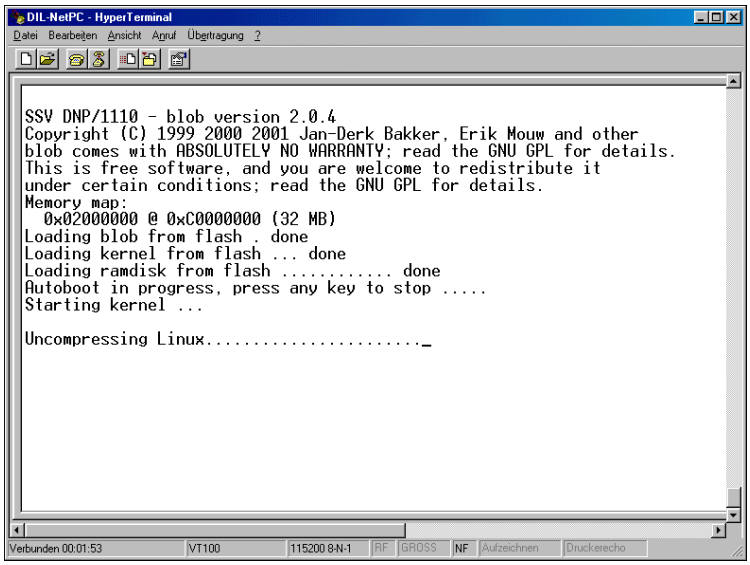


Figure 11: DIL/NetPC boot Process

For a first test of the DNP/1110 you have to change the assigned IP-address of your development system to "192.168.0.1". To change the IP-address under MS-Windows just click "Start→Settings→Control Panel→Network→TCP/IP" and enter the new IP-address. Please make sure, that you don't use another IP-address – this will lead to different network problems.

6.1.2 Checking the Ethernet Link

To test the TCP/IP-communication we use **PING** a very popular TCP/IP-utility program. Please open a DOS window (you can find it in the Windows Start menu) and enter:

ping 192.168.0.126.

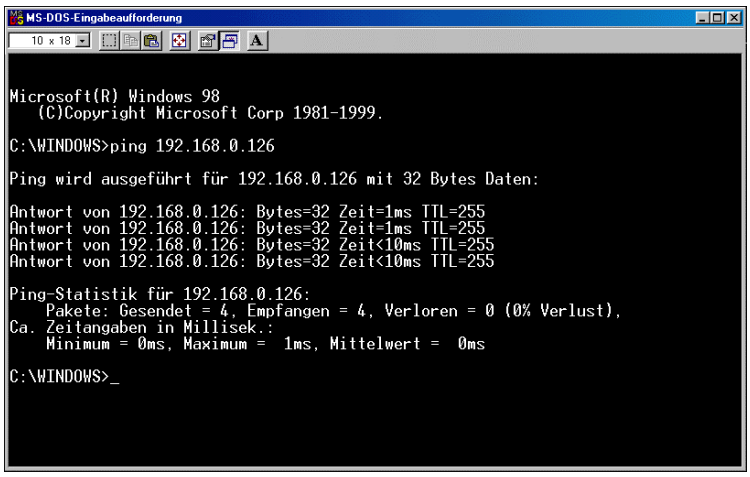


Figure 12: Communication check via PING

The Starter Kit must answer this ping. Otherwise an error will occur. In this case you have to check all parts of your LAN-connection, including the IP-address of the development system. Then you should check the correct IP-address setting to the value "192.168.0.1". For an easy check of the IP-address, you can use the following DOS-command:

ipconfig

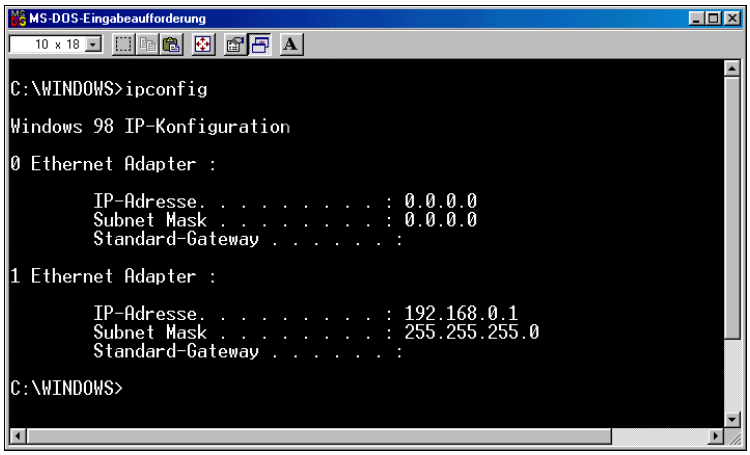


Figure 13: Communication check via ipconfig command

Once the ping was successful, you are ready to start a Web browser on your development PC. This browser can be the Microsoft Internet Explorer or another suitable Web browser like the Netscape Communicator or Opera or similar.

6.1.3 Web Server Access

Open the URL ***http://192.168.0.126/index.htm***. The Embedded Web Server will deliver you a small description about the DNP/1110. That's it. Now you are online with the Starter Kit and your Web browser is connected to the Embedded Web Server of the DNP/1110. It shows you a static web page with some pictures. Figure 14 show you this Web page in the browser window.

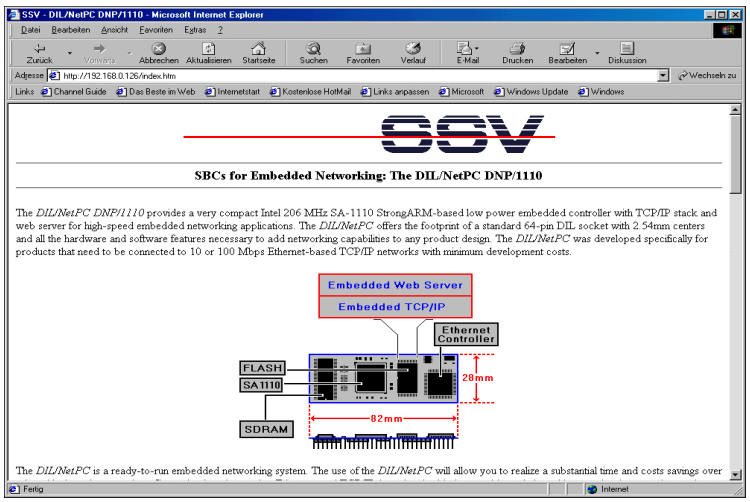


Figure 14: DNP/1110 Web page shown by the MS-Internet Explorer

If your Web browser can't establish a connection to the Web Server – but the Ping was successful – you should check your browser settings. Please ensure, that your browser is joined with TCP/IP by using the Ethernet card in your development system. Alternatively you have to install a suitable Web browser.

In some cases the Web browser is only configured for modem based Internet access. In this case, please install a second Web browser from your original operating system CD-ROM.

6.1.4 Login via Serial Console

With a development system running under MS-Windows you can gain access onto the DNP/1110 via HyperTerminal by using the username ***gast***. There is no specific password needed. On the point where the password is expected simply press the ***Enter*** (Return) key. Your system is now ready to execute arbitrary commands.

Figure 15: Login procedure via HyperTerminal

6.1.5 Login via Telnet

You are now able to start a Telnet client on the development system. Open a command shell and enter the following command:

telnet 192.168.0.126

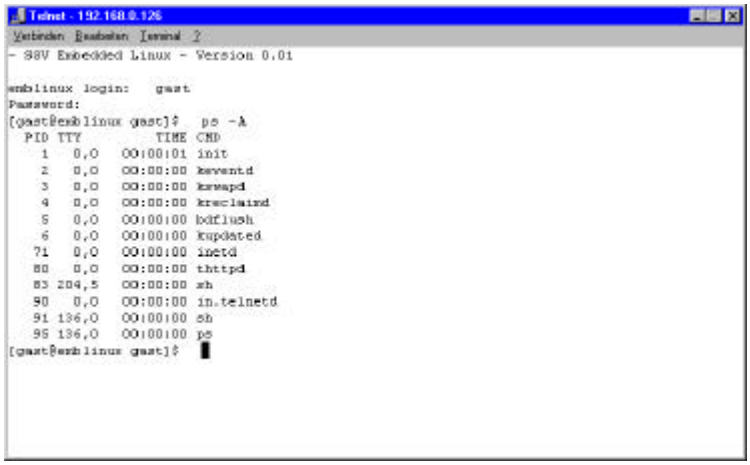


Figure 16: Login procedure via Telnet

Please pay attention, that this command will pass the IP-address of your DNP/1110 in shape of a parameter to the client.

6.1.6 File Transfer via FTP

The **File Transfer Protocol (FTP)** provides a common approach to transfer files between clients and servers. FTP is a client/server protocol like Telnet. The FTP client/server capability is build into the most Windows versions. An FTP session begins when the client build a TCP/IP connection to the server. Once this connection is established, the client will log on to this server. In our actual case your development system acts as client and the DNP/1110 operate as server. After the successful access onto the server you are able to execute various file transfer commands, which typically involves navigating the FTP server's directory structure and send or receive files. In the following an example of a FTP session is shown.

To use the File Transfer Protocol on your system, please open a DOS window (via the Windows Start menu) and branch into the desired subdirectory. Now enter ***FTP 192.168.0.126*** and open a FTP connection between client and server. The system will now ask you for a username. To answer this request please enter ***gast*** and confirm the expected password with simply pressing the ***Enter***-key. At this point there is no specific password required. On figure 17 you see the described user inputs in form of highlighted text.

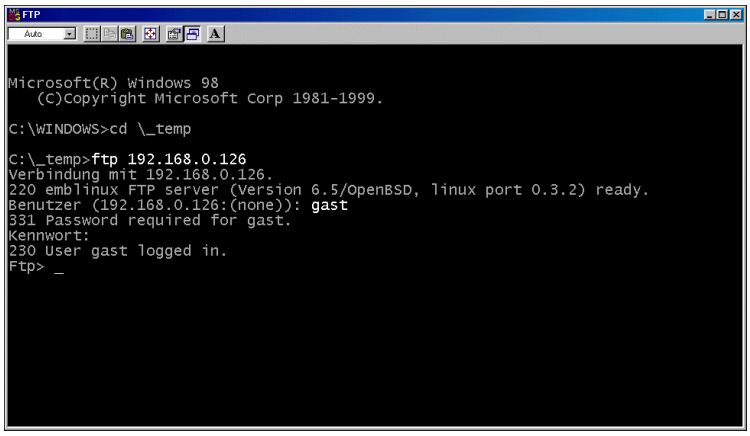


Figure 17: Login procedure via FTP

Now you are ready to transfer a file from your Windows-based development system to the DNP/1110. Before you can transfer a file with FTP you should check, that the FTP link is correctly set to the binary operation mode via the ***binary*** command. In some cases the default setting is ASCII. With the ***pwd*** command you can check out the name of the remote directory. Please note, that the Read/Write access is only allowed for the directory ***/home/gast***. To transfer a file from your development system to the DNP/1110 use the command:

put filename.

For a first view on the content of a directory you should use ***ls –al***. This command shows you the files stored inside a specific directory. To terminate a FTP session use the command ***bye***. This will cancel every operation between client and server. The figure 18 shows you these operations.

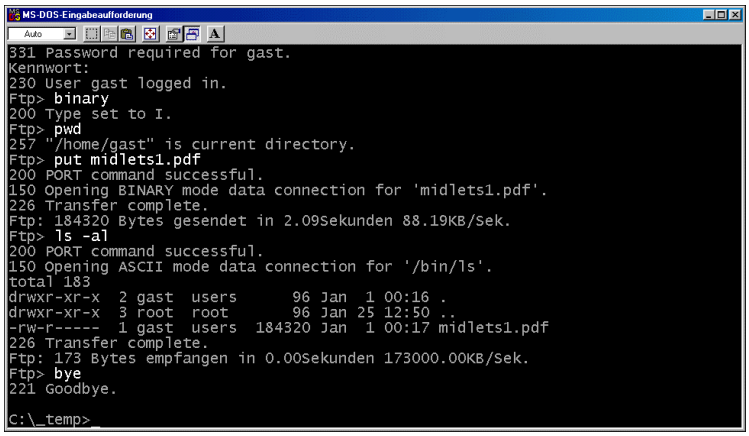


Figure 18: FTP file transfer under DOS

In some Windows versions the Internet Explorer is able to act as FTP client just like an Internet browser. To transfer files by using the Internet Explorer enter ***ftp://gast@192.168.0.126*** as URL into the address bar. Moreover open the Windows Explorer as second file destination. Now you can transfer your desired files very easy by using drag and drop between these two windows. Simply drag the selected file(s) from the Windows Explorer into the Internet Explorer window and drop it down into the choosen directory.

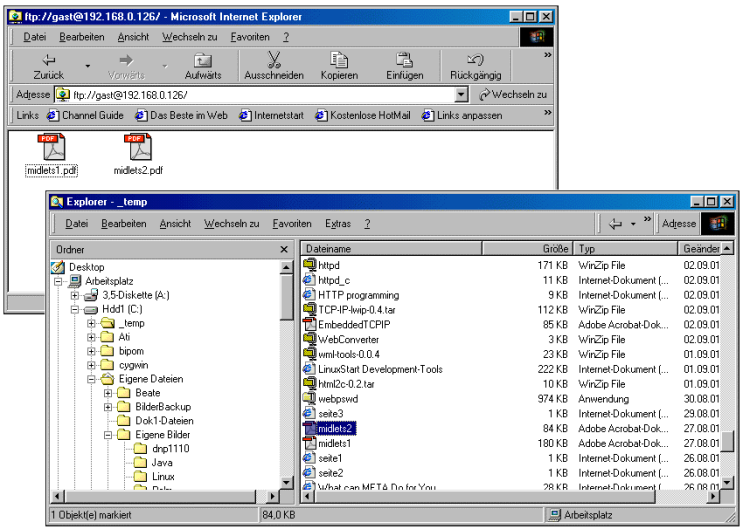


Figure 19: File transfer using the Internet Explorer

6.1.7 Embedded Linux Maintenance

The Embedded Linux of the DNP/1110 consists of two basic parts. At first the file *zimage* as Linux-kernel and second the root filesystem in form of the file *rimage.gz*. Each component exists as a separate file. You can find the file *rimage.gz* on the DIL/NetPC Starterkit CD-ROM under the location ***\Linux\DNP1110-Bin\rimage.gz***. The file *zimage* is placed in the directory ***\Linux\DNP1110-Bin\zimage\bin\zimage***

For updates or the newest versions of these files please check out our website at: *http://www.dilnetpc.com*

6.1.8 Embedded Linux Maintenance via HyperTerminal/Serial Link

The DNP/1110 offers the capability to upload a Linux binary image, to save it into the Flash memory and to reboot the system after a successful receive. Please open a HyperTerminal window and reboot the DNP/1110.Now you have to invoke the Flash Loader. For this you have to press ***CTRL+L*** during the boot procedure. Figure 20 shows the BIOS report sequence.

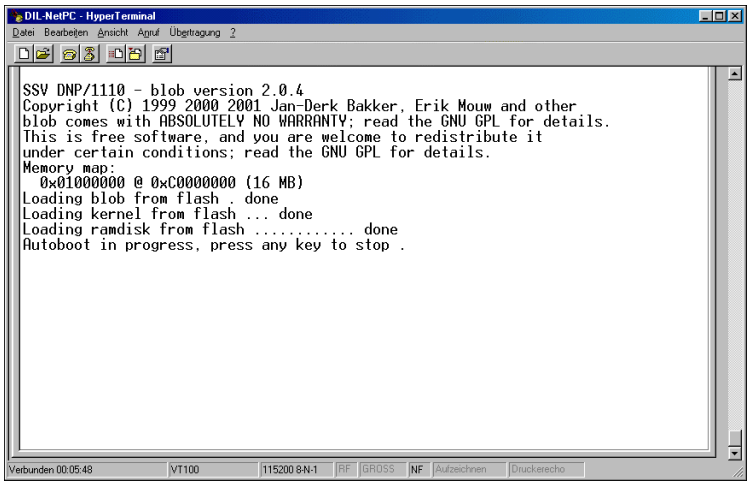


Figure 20: Boot Procedure

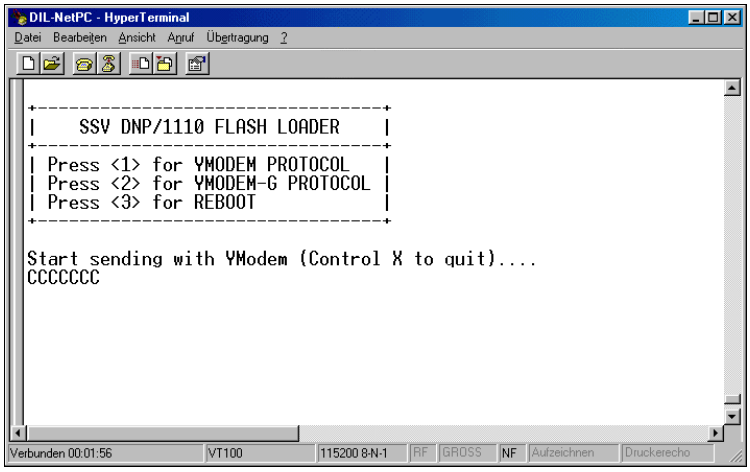


Figure 21: Flash Loader Messages

Once the BIOS detect the CTRL+L the Flash Loader invokes and offers three options (see Fig. 20). Please choose option "1" to transfer data via "YMODEM PROTOCOL". Once you have pressed the key "1" the Flash Loader is set in a wait state until a file to transfer is selected in the appearing window. During this status the Flash Loader is continously sending the letter "C" to the console as you can see in figure 222. With this sign the YMODEM synchronizes the beginning of a file transmission.

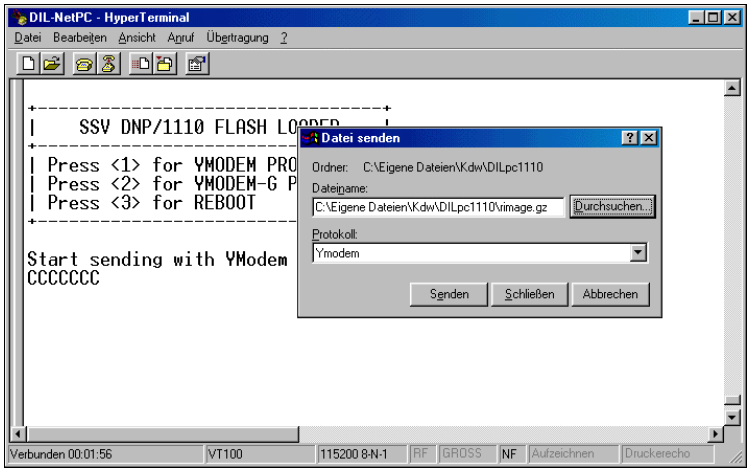


Figure 22: Flash Loader file Select

Now select the desired file (*rimage.gz* or *zimage*) in the appearing window and start the transmition with YMODEM.

During the download you will see a progress bar that indicates the state of the transmission. Please wait absolutely until the file transmission ends and avoid interruptions. In case of an interruption or failure the DNP/1110 would not contain any bootable system and you have to repeat the transmission procedure.

After the end of transmission the Flash Loader returns into the menu and continues sending the "C" sign. To reboot the DNP/1110 with the new kernel and/or root filesystem choose option "3" (REBOOT) from the Flash Loader menu.

6.2 Using a Linux–based development System

The following paragraphs will help you to use the DNP/1110 with a development system running under Linux. For this steps are some programs necessary that normally come along with the Linux installation (i.e. Minicom). Please make sure that these programs are present on your development system. If necessary you have to install these programs from your Linux installation CD.

6.2.1 Setup the Serial Link

Before you provide the Evaluation Board with power for the first time, please run a terminal program like **Minicom**. Minicom is a simple serial communications program originally written by Miquel van Smoorenburg. It offers base communication capabilities and integrates well with the Linux user interface. Minicom is a lot like the old MS-DOS program PROCOMM. This program can be used to connect a Linux-based PC to embedded devices such as the DNP/1110 for initial configurations. In the following we will show you how to use Minicom and what you have to do to adjust the necessary settings.

Open a terminal window and type in the command ***minicom -s*** to become access to the serial port settings. Now you can change some configuration parameters – such as the maximum baud rate. Set the serial port parameters for the maximum baud rate on "115.200 bps".

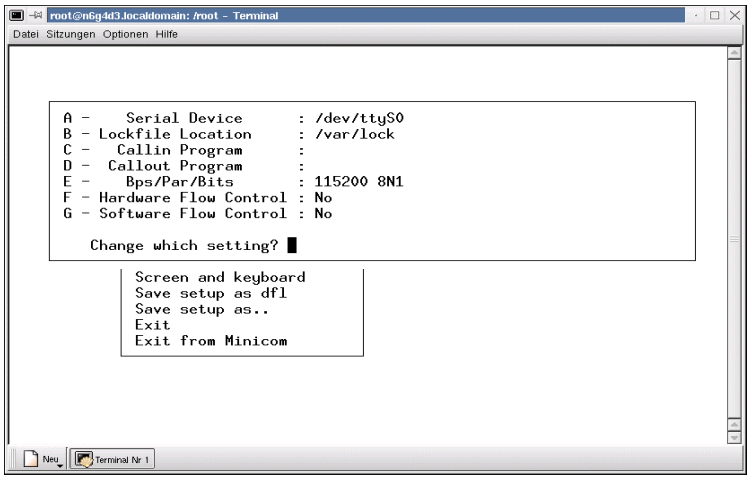


Figure 23: Serial Port Settings under Minicom

After that, please turn on the power for the Evaluation Board. You will now see all steps of the DNP/1110 boot process via Minicom.

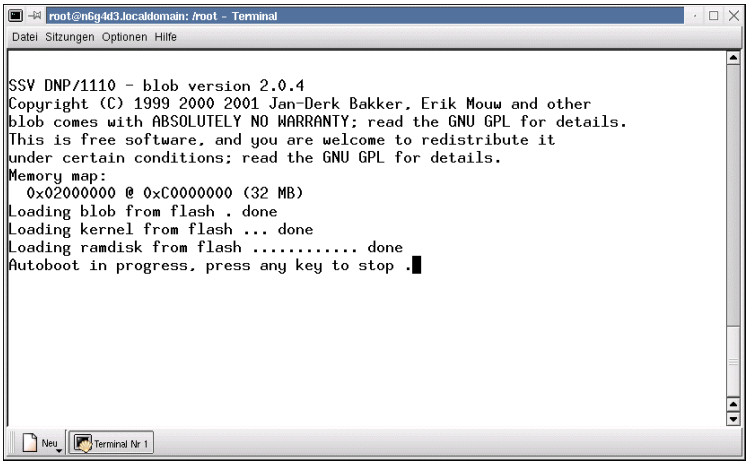


Figure 24: Boot Procedure

To the end of this sequence a login request will appear. The boot process of the DNP/1110 is now complete.

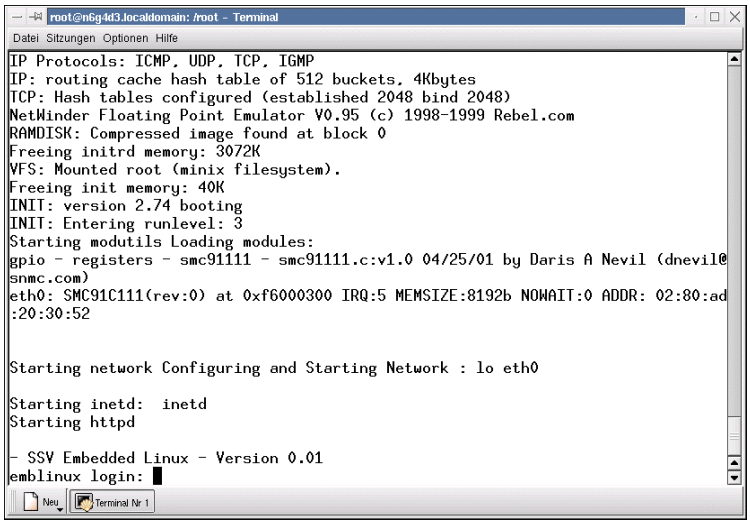


Figure 25: Login Request

6.2.2 Checking the Ethernet Link

Please open a terminal window and type in ***ping 192.168.0.126***. Every ping request has to be answered by your DNP/1110 similar as shown in figure 26.

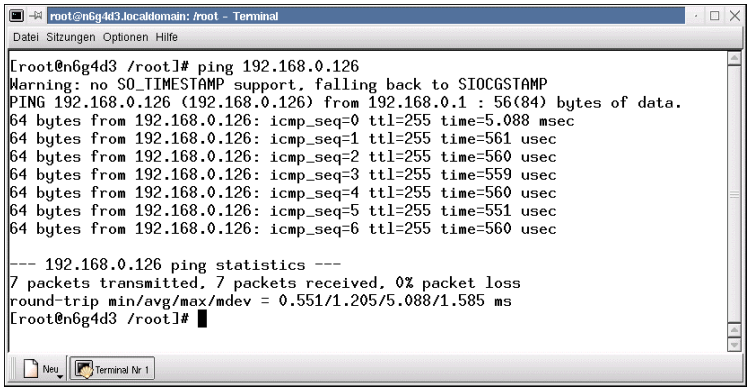


Figure 26: Ping Request

To cancel the ping request just press the keyboard shortcut ***Ctrl+C***. If an error occurs (e.g. the DNP/1110 don't answer the ping of your development system) you have to check your cable connections at first.

Then you should check that the IP-address is set correctly to "192.168.0.1". For an easy check of the IP-address, you can use the Linux-command ***ifconfig***.

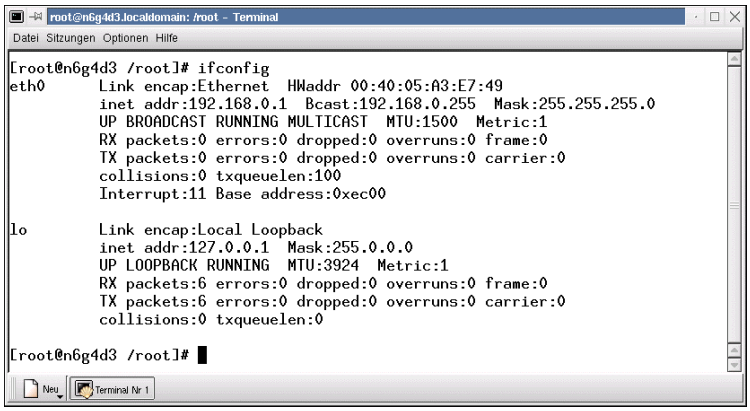


Figure 27: IP-address check via ifconfig

6.2.3 Web Server Access

Once the ping was successful, you are ready to start a Web browser on your development system. This may be the Konqueror File Manager or the Netscape Communicator/Navigator. The Konqueror File Manager is normally part of the Linux installation and acts as File Manager as well as Web browser. Konqueror is able to detect automaticaly when an URL were entered and shows the content.

Just enter the URL ***http://192.168.0.126/index.htm*** and press the ***Enter***-key. The Embedded Web Server will deliver you a small description about the DNP/1110.

That's it. You are now online with the Starter Kit. The Web browser of your development system is connected to the Embedded Web Server of the DNP/1110 and shows you a static web page with some pictures. The figure 28 will show you this.

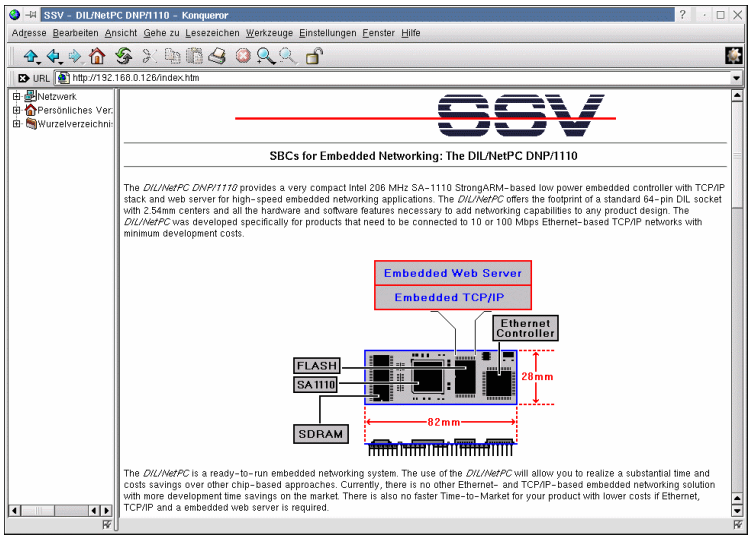


Figure 28: DNP/1110 Web page shown by the Konqueror File Manager

6.2.4 Login via Serial Console

Under Linux you can gain access onto the DNP/1110 via Minicom by using the username ***gast***. A specific password is not necessary. At this point simply press the ***Enter*** (Return) key. Your system is now ready to execute arbitrary Linux commands.

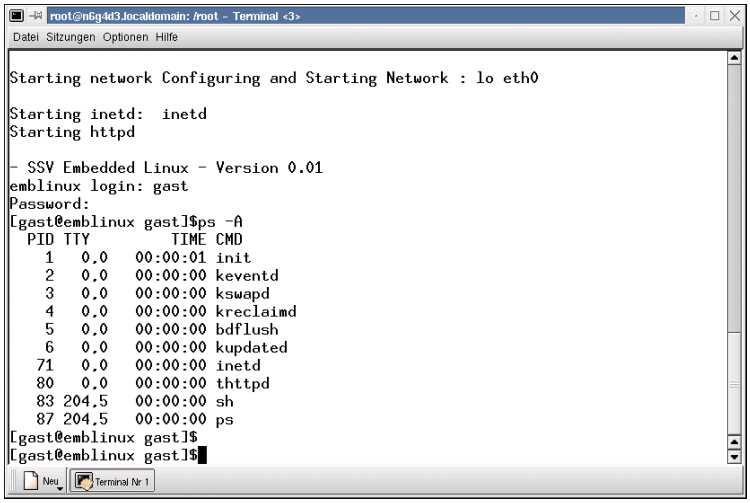


Figure 29: Login procedure via Minicom

6.2.5 Login via Telnet

You are now able to start a telnet client on the development system. Open a Minicom command shell and enter the following command:

telnet 192.168.0.126

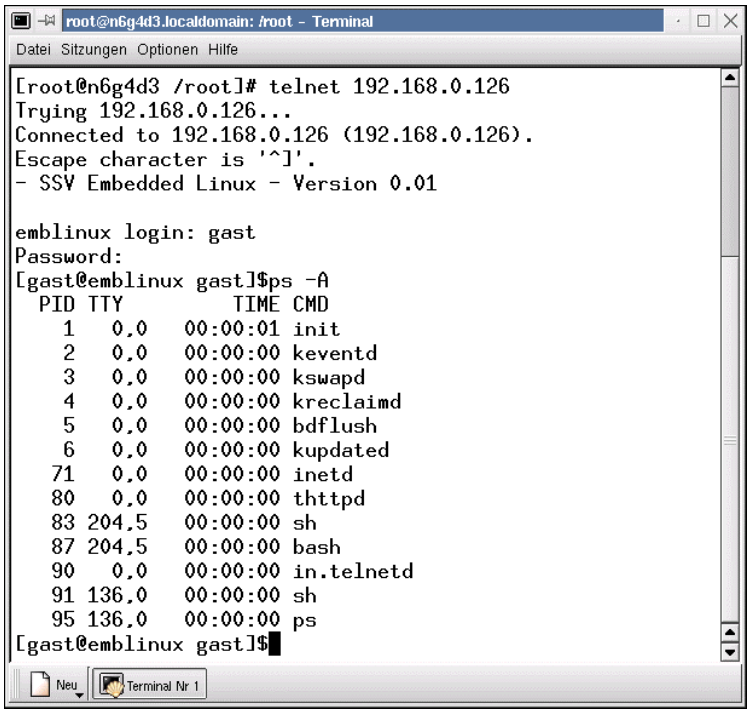


Figure 30: Login procedure via Telnet

Please pay attention, that this command will pass the IP-address of your DNP/1110 in shape of a parameter to the client.

6.2.6 File Transfer via FTP

The **File Transfer Protocol** (FTP) provides a common approach to transfer files between clients and servers. FTP is a client/server protocol like Telnet. An FTP session begins when the client build a TCP/IP connection to the server. Once this connection is established, the client will log on to this server. In our actual case your development system acts as client and the DNP/1110 operates as server. After the successful access onto the server you are able to execute various file transfer commands, which typically involves navigating the FTP server's directory structure and send or receive files. In the following an example of a FTP Session is shown. The FTP client/server capability is already build into the Konqueror.

To use the File Transfer Protocol on your Linux system please open a command shell, like Minicom and branch into the desired subdirectory. Now enter ***FTP 192.168.0.126*** and open a FTP connection between client and server. The system will now ask you for a username. To answer this request please enter ***gast*** and confirm the expected password with pressing ***Enter***. At this point there is no specific password required. On the figure 31 you see the user inputs as highlighted text.

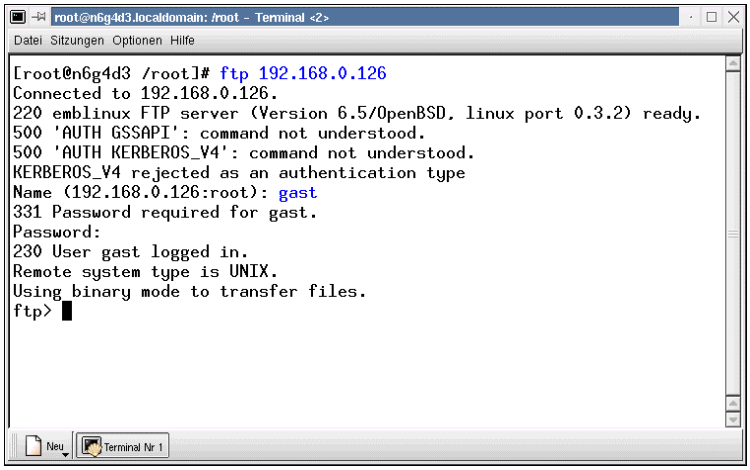


Figure 31: Login procedure via FTP

Now you are ready to transfer a file from a Linux-based development system to the DNP/1110. Before you can transfer a file with FTP you should check, that the FTP link mode is correctly set to the binary operation mode via the ***binary*** command. In some cases the default setting is ASCII. With the command ***pwd*** you can check out the name of the remote directory. The Read/Write access is only allowed for the directory ***/home/gast***. To transfer a file from your development system to the DNP/1110 use ***put filename*** to transfer the desired file.

For a first view on the content of a directory you should use ***ls –al***. This command shows you the files stored inside a specific directory. To terminate a FTP session use the command ***bye***.

This command cancels every operation between server and client. The figure 32 shows you these operations.

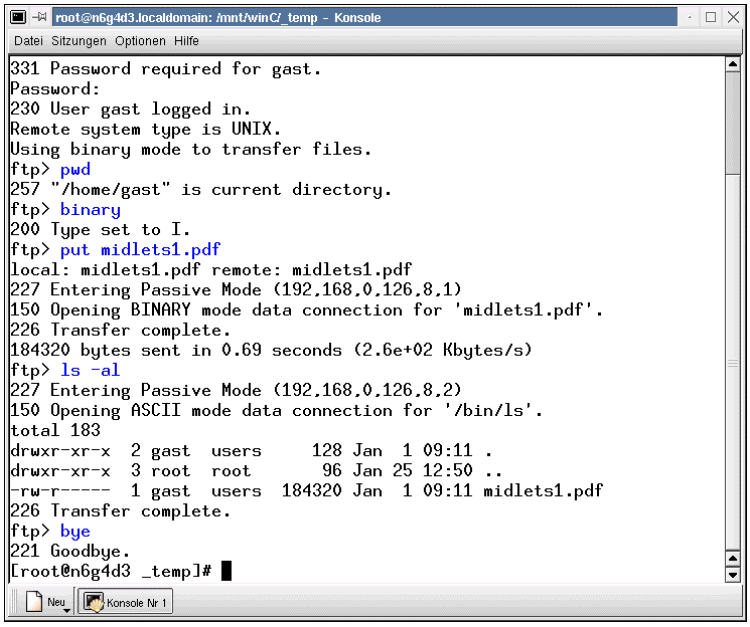


Figure 32: File transfer with Minicom

Next to Minicom it is also possible to use the Konqueror File Manager to transfer files by FTP. For this, please open Konqueror and enter ***ftp://gast@192.168.0.126*** as URL into the address bar. The Konqueror knows the difference between your system directories and folders (\\) and an Internet or intranet address (//). So you can simply type in the desired address. Open a second instance of Konqueror and change into the desired source directory. After that, you are able to transfer arbitrary files very easy by using drag and drop between these two Konqueror windows.

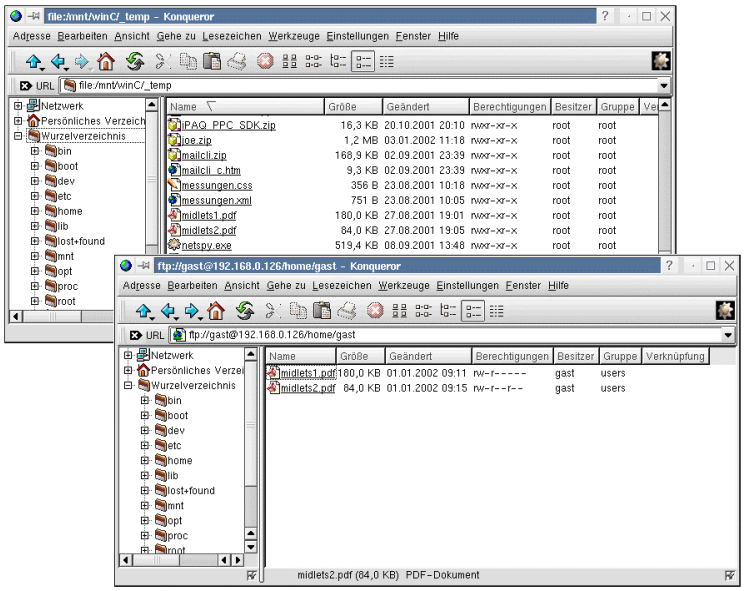


Figure 33: File transfer with the Konqueror

6.2.7 Embedded Linux Maintenance

The Embedded Linux of the DNP/1110 consists of two basic parts. At first the file *zimage* as Linux-kernel and second the root filesystem in form of the file *rimage.gz*. Each of the both components exists as one separate file. You can find the file *rimage.gz* on the DIL/NetPC Starterkit CD-ROM under the location ***\Linux\DNP1110-Bin\rimage.gz***. The file *zimage* is placed in the direcory ***\Linux\DNP1110-Bin\zimage\bin\zimage***

For updates or the newest versions of these files please check out our website at: *http://www.dilnetpc.com*

6.2.8 Embedded Linux Maintenance via Minicom/Serial Link

The DNP/1110 offers the capability to upload a Linux binary image, to save it into the Flash memory and to reboot the system after a successful receive. Please open a Minicom window and reboot the DNP/1110. Now you have to invoke the Flash Loader. For this press ***CTRL+L*** during the boot procedure. Figure 34 shows the BIOS report sequence.

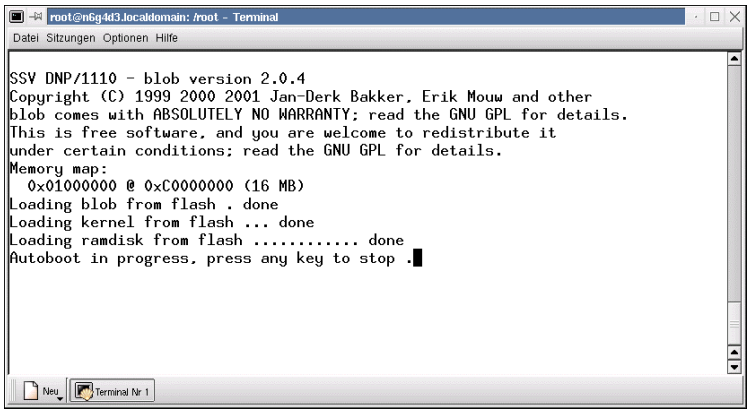


Figure 34: Boot Procedure

Once the BIOS detect the CTRL+L the Flash Loader invokes and offers three options (see figure 35).

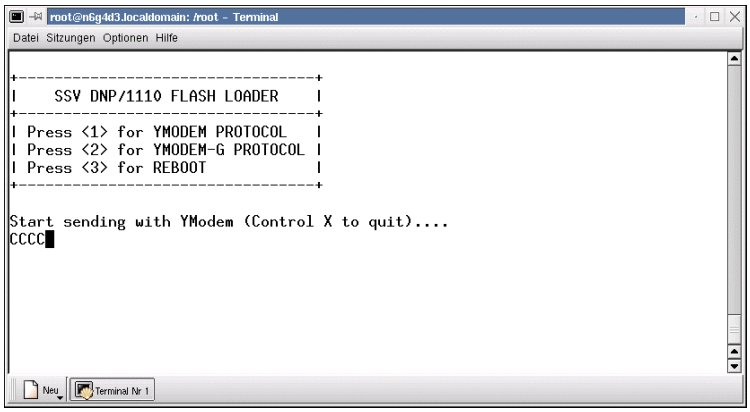


Figure 35: Flash Loader Messages

Please choose option "1" to transfer data via "YMODEM PROTOCOL". Once you have pressed the key "1" the Flash Loader is set in a wait state. During this status the Flash Loader is continously sending the letter "C" to the console as you can see in figure 35. With this sign the YMODEM synchronize the beginning of a file transmission.

Open the Minicom upload menu with the key combination ***ALT+S***. Now you see five options to transmit data. On this point you have absolutely to choose the option "zmodem".

The reason to do this although you normally would choose ymodem is a little bug in Minicom, so here you have to select zmodem absolutely. Choosing "ymodem" may result in different error messages.

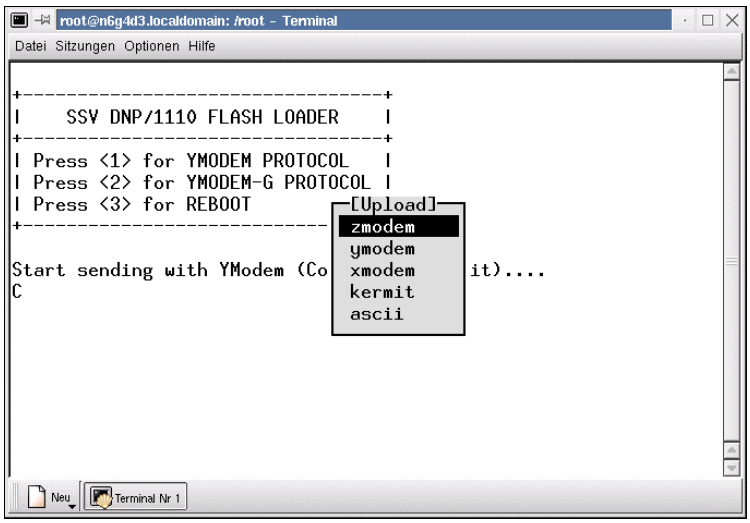


Figure 36: Transfer method Select

After you have choosen the transmission method Minicom opens a new window. Now select the desired file (*rimage.gz* or *zimage*) and start the transmission.

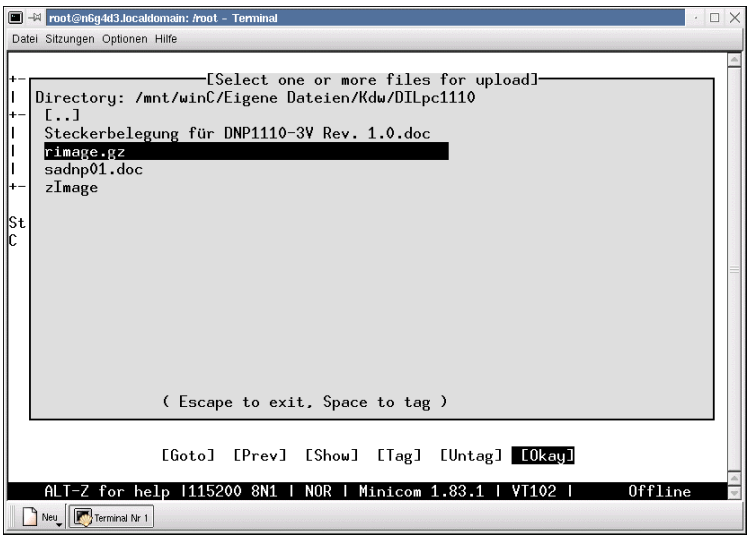


Figure 37: Transmission file Select

During the download you will see a progress bar that indicates the transmission status. Please wait absolutely until the file transmission ends and avoid every interruption. In case of an interruption or failure the DNP/1110 would not contain any bootable system and you have to repeat the transmission procedure.

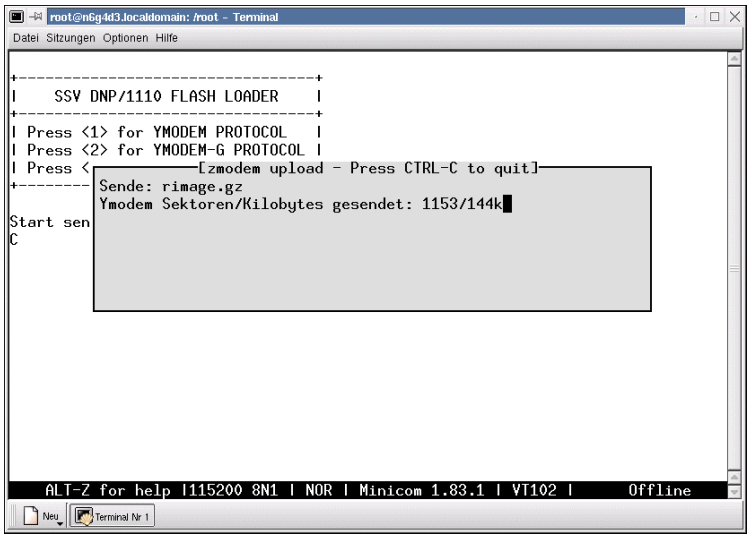


Figure 38: Transmission Status

After a successful transmission the FLASH Loader returns into the menu and continues with sending the letter "C". To reboot the DNP/1110 with the new kernel and/or root filesystem choose option "3" (REBOOT) from the Flash Loader menu. After this, the DNP/1110 restarts with the new kernel and/or root filesystem

6.2.9 Installation of the GNU Cross Toolchain

Within the scope of supply of the DNP/1110 Starter Kit we deliver a full pre-build GNU cross toolchain as development environment. With this cross development environment you are able to create the necessary code for the DNP/1110 with StrongARM architecture although you work on an x86 Linux-based development system. The complete cross development environment exists in form of a single tar-archive on the Starter Kit CD-ROM. On figure 38 you can see the location of this tar-archive in the directory:

/Linux/DNP1110-ToolChain

This compressed archive has a size of approximately 85 MByte.

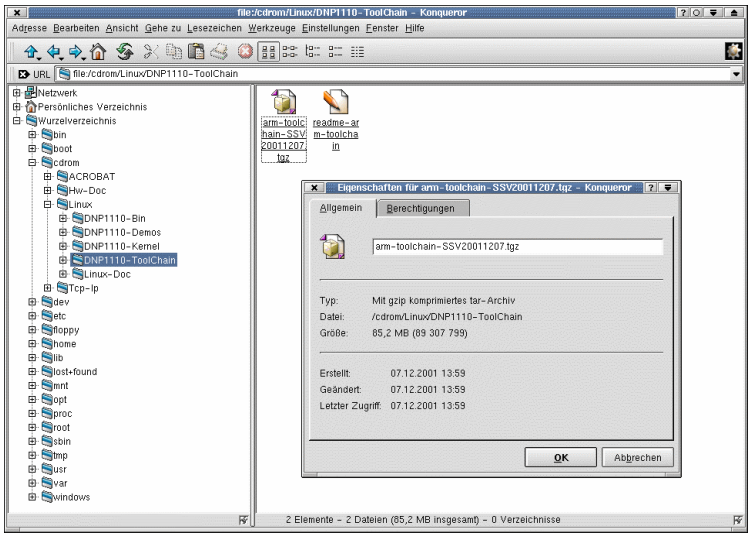


Figure 39: Location of the tar-archive on the Starter Kit CD-ROM

To install the toolchain archive on your Linux-based development system you have to be logged-in as Administrator with the respective rights. After this, you just have to unpack the entire tar-archive outgoing from the directory

/usr/local

To unpack these archive please execute the following Linux command line from a terminal window. You can see this also on figure 40:

tar –xzf /cdrom/Linux/DNP1110-ToolChain/arm-toolchain-39SSV20011207.tgz

Instead of ***…/cdrom/…*** please use the correct path to your own CD-ROM drive. The Linux tar program needs some time to unpack all files from the CD-ROM to your hard disk.

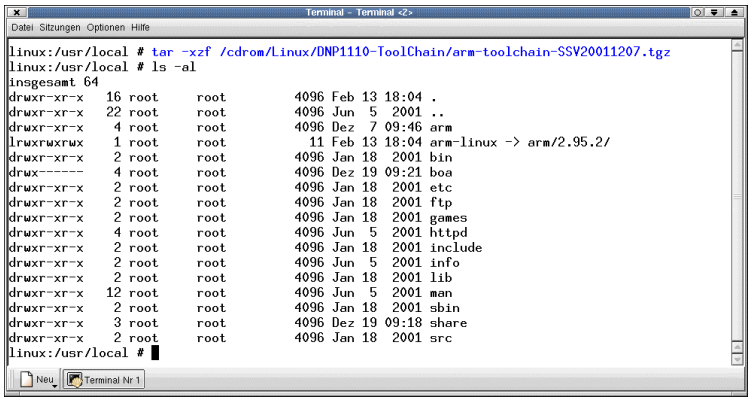


Figure 40: Unpacking the tar-Archive

For a first test of your new cross development environment you should save a simple C source code – like the *Hallo Welt* program shown in figure 41 – into a file within the directory ***/usr/local***. Under Linux you can do this directly via the command:

cat > filename

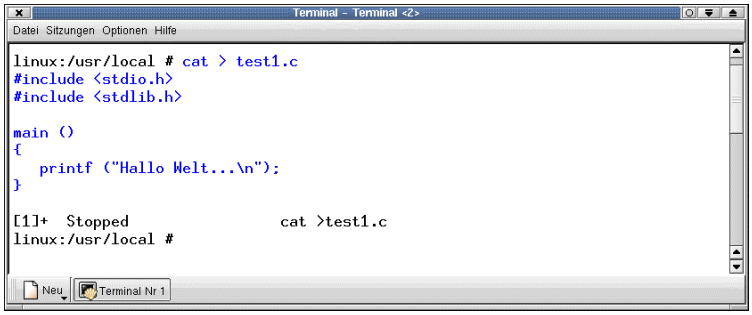


Figure 41: A simple C-Program

To complete the C source code input, please press the key combination ***CTRL+Z***. If desired it is possible to check the file content by entering the command line:

cat test1.c

At next the GNU C cross compiler have to translate this C source code for the first time. During this translation process no error messages may occur. To build an executable binary file *test1* from *test1.c* use the following Linux command line from a terminal window:

/usr/local/arm/2.95.2/bin/arm-linux-gcc –o test1 test1.c

The figure 42 shows this command line.

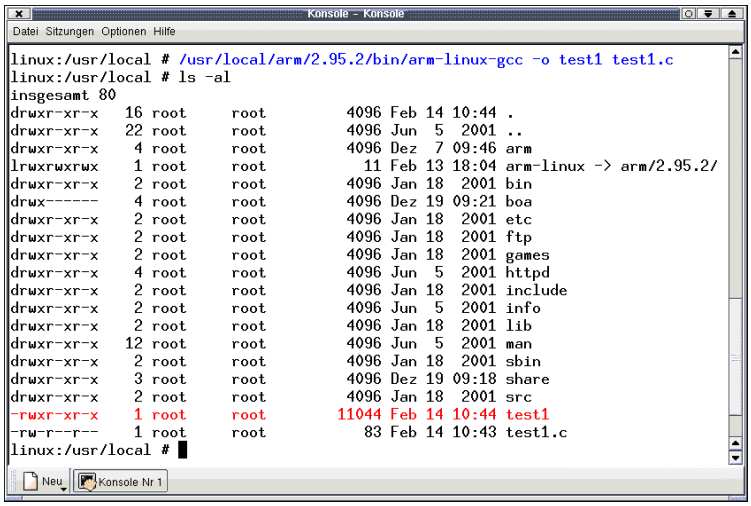


Figure 42: C-source code Compiling

After this, transfer the executable binary file from your development system to the DNP/1110 RAM disk within a FTP session. For this, enter the following command line within a terminal window and open a FTP connection between client and server:

ftp 192.168.0.126

The system asks now for a username. To answer this request please enter ***gast*** and confirm the expected password with pressing ***Enter***. At this point of time there is no specific password required.

To transfer the binary file test1 from your development system to the DNP/1110 use the command:

put test1

After the successful transfer you can terminate the FTP session with the command:

bye

This command will cancel every operation between client and server. On figure 43 you see the required user inputs as highlighted text.

At least run the new binary file on your DNP/1110. Open a Telnet session and start the program.

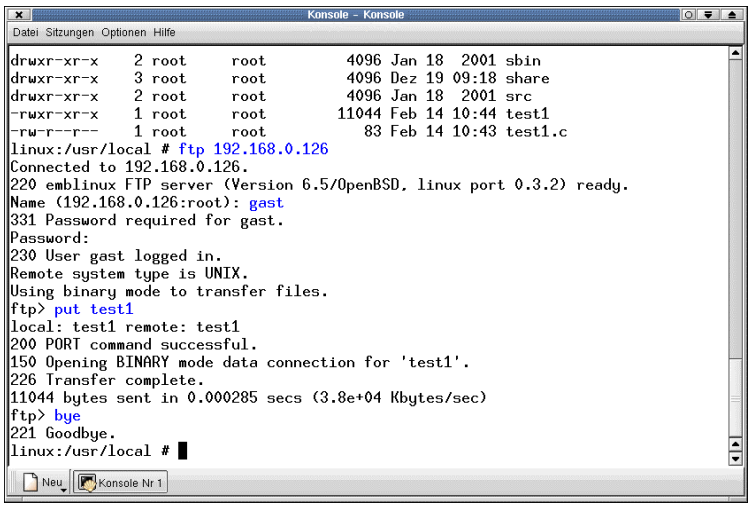


Figure 43: File transfer with FTP

Please note: During the FTP file transfer process the executable attribute of *test1* can get lost. Without this attribute it is not possible to execute this file. Some FTP clients watch the attributes. In this case you can skip the next step.

To restore the executable attribute (lost by the FTP transfer) enter the command line:

chmod +x test1

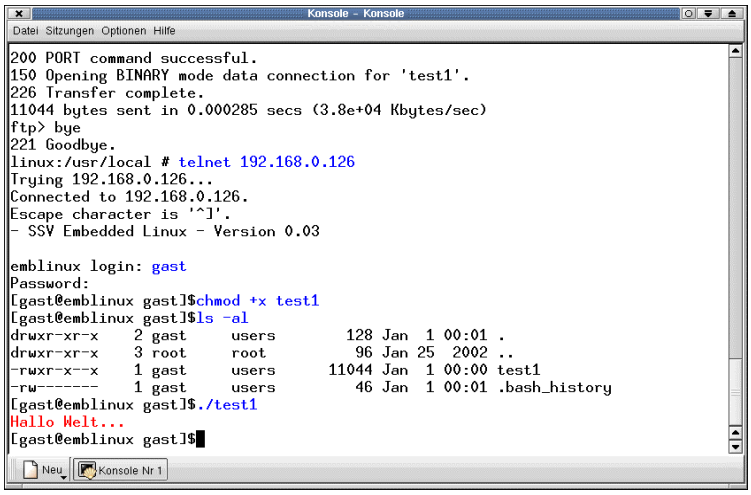


Figure 44: Telnet Session

After the executable attribute were reassigned you should check the correct status with the command ***ls –al***. Now you will see the content of the directory named gast. To execute the transferred and assembled file please type in:

. /test1

The file will now be executed and deliver the output "Hallo Welt…" to you.

For the assembling of a C-program the gcc will normally be activated by using a so-called makefile.

```
CROSS =    /usr/local/arm/2.95.2/bin/arm-linux-
CC    =    $(CROSS)gcc
CFLAGS=    -Wall –O2 –march=armv4 –mtune=strongarm
LFLAGS=    -Wl,-s

$(PROJ):   $(PROJ).c Makefile
           $(CC)  $(CFLAGS)  $(PROJ).c  -o  $(PROJ)
           $(LFLAGS)
clean:
           rm –f $(PROJ)
```

All required parameters needed to create the desired binary file are stored in such a makefile.

Appendix 1: DNP/1110 Pinout – JEDEC 64-pin DIL Connector (1. Part)

Pin	Name	Group	Function
1	PA0	PIO	Parallel I/O, Port A, Bit 0
2	PA1	PIO	Parallel I/O, Port A, Bit 1
3	PA2	PIO	Parallel I/O, Port A, Bit 2
4	PA3	PIO	Parallel I/O, Port A, Bit 3
5	PA4	PIO	Parallel I/O, Port A, Bit 4
6	PA5	PIO	Parallel I/O, Port A, Bit 5
7	PA6	PIO	Parallel I/O, Port A, Bit 6
8	PA7	PIO	Parallel I/O, Port A, Bit 7
9	PB0	PIO	Parallel I/O, Port B, Bit 0
10	PB1	PIO	Parallel I/O, Port B, Bit 1
11	PB2	PIO	Parallel I/O, Port B, Bit 2
12	PB3	PIO	Parallel I/O, Port B, Bit 3
13	PB4	PIO	Parallel I/O, Port B, Bit 4
14	PB5	PIO	Parallel I/O, Port B, Bit 5
15	PB6	PIO	Parallel I/O, Port B, Bit 6
16	PB7	PIO	Parallel I/O, Port B, Bit 7
17	PC0	PIO	Parallel I/O, Port C, Bit 0
18	PC1	PIO	Parallel I/O, Port C, Bit 1
19	PC2	PIO	Parallel I/O, Port C, Bit 2
20	PC3	PIO	Parallel I/O, Port C, Bit 3
21	RXD1	SIO	COM1 Serial Port, RXD Pin
22	TXD1	SIO	COM1 Serial Port, TXD Pin
23	CTS1	SIO	COM1 Serial Port, CTS Pin
24	RTS1	SIO	COM1 Serial Port, RTS Pin
25	DCD1	SIO	COM1 Serial Port, DCD Pin
26	DSR1	SIO	COM1 Serial Port, DSR Pin
27	DTR1	SIO	COM1 Serial Port, DTR Pin
28	RI	SIO	COM1 Serial Port, RI Pin
29	RESIN	RESET	RESET Input
30	TX+	LAN	Ethernet Interface, TX+ Pin
31	TX-	LAN	Ethernet Interface, TX- Pin
32	GND	----	Ground

Table 4: DNP/1110 Pinout – Pin 1 to 32

Appendix 2: DNP/1110 Pinout – JEDEC 64-pin DIL Connector (2. Part)

Pin	Name	Group	Function
33	RX+	LAN	Ethernet Interface, RX+ Pin
34	RX-	LAN	Ethernet Interface, RX- Pin
35	RESOUT	RESET	RESET Output
36	VBAT	PSP	Real Time Clock Battery Input
37	CLKOUT	PSP	Clock Output (Default 3.6864 MHz)
38	TXD2	PSP	COM2 Serial Port, TXD Pin
39	RXD2	PSP	COM2 Serial Port, RXD Pin
40	INT5	PSP	Interrupt Input 5
41	INT4	PSP	Interrupt Input 4
42	INT3	PSP	Interrupt Input 3
43	INT2	PSP	Interrupt Input 2
44	INT1	PSP	Interrupt Input 1
45	CS4	PSP	Chip Select Output 4
46	CS3	PSP	Chip Select Output 3
47	CS2	PSP	Chip Select Output 2
48	CS1	PSP	Chip Select Output 1
49	RDY	PSP	External Ready Input
50	RD	PSP	Read Signal, Expansion Bus
51	WR	PSP	Write Signal, Expansion Bus
52	SA3	PSP	Expansion Bus, Address Bit 3
53	SA2	PSP	Expansion Bus, Address Bit 2
54	SA1	PSP	Expansion Bus, Address Bit 1
55	SA0	PSP	Expansion Bus, Address Bit 0
56	SD7	PSP	Expansion Bus, Data Bit 7
57	SD6	PSP	Expansion Bus, Data Bit 6
58	SD5	PSP	Expansion Bus, Data Bit 5
59	SD4	PSP	Expansion Bus, Data Bit 4
60	SD3	PSP	Expansion Bus, Data Bit 3
61	SD2	PSP	Expansion Bus, Data Bit 2
62	SD1	PSP	Expansion Bus, Data Bit 1
63	SD0	PSP	Expansion Bus, Data Bit 0
64	VCC	----	3.3 Volt Power Input

Table 5: DNP/1110 Pinout – Pin 33 to 64

Appendix 3: DNP/1110 Memory Map

Physical Addr.	Virtual Addr.	Description	Cached	Buffered	Access
0x00000000-0x07FFFFFF	0xE8000000-0xEFFFFFFF	16 Mbyte FLASH	No	No	R/W
0x20000000-0x20FFFFFF	0xF6000000-0xF6FFFFFF	Ethernet Controller	No	No	R/W
0x30000000-0x30FFFFFF	None	Chip Select Signal CS1	No	No	R/W
0x31000000-0x31FFFFFF	None	Chip Select Signal CS2	No	No	R/W
0x32000000-0x32FFFFFF	None	Chip Select Signal CS3	No	No	R/W
0x33000000-0x33FFFFFF	None	Chip Select Signal CS4	No	No	R/W
0x80000000-0xB7FFFFFF	0x80000000-0xB7FFFFFF	SA-1110 internal Registers	No	No	R/W
0xC0000000-0xC7FFFFFF	0x00000000-0x07FFFFFF	32 Mbyte SDRAM	Yes	Yes	R/W

Table 6: DNP/1110 Memory Map

Appendix 4: Using the Compact Flash (CF)-Interface

The DNP/1110 offers the possibility to connect a Compact Flash (CF) adapter to realize different system expansions. Figure 45 shows a general diagram how to connect a CF-interface onto the DNP/1110.

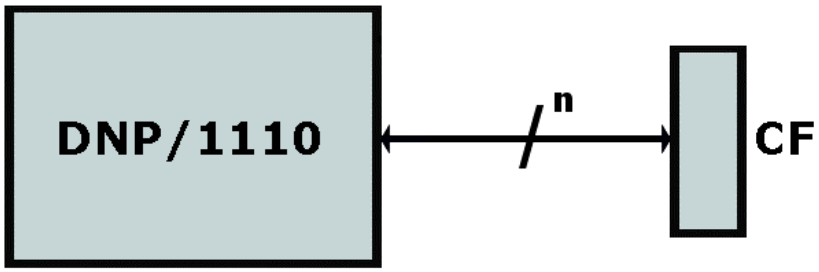


Figure 45: DNP/1110 CF-Interface Connection

This chapter describes only one possible capability to connect an 8-bit CF-interface. This interface is running in memory mode. For the memory mode SSV Embedded System offers a Linux device driver. For more information please contact SSV. Table 7 shows which connections have to be made between the pins of the DNP/1110 and the 8-bit Compact Flash interface.

Table 7 shows which connections have to be made between the pins of the DNP/1110 and the 8-bit Compact Flash interface.

From		To	Function
DNP/1110 Pin	**Other**	**CF Pin**	
63		21	Data 0
62		22	Data 1
61		23	Data 2
60		2	Data 3
59		3	Data 4
58		4	Data 5
57		5	Data 6
56		6	Data 7
55		20	Addr. 0
54		19	Addr. 1
53		18	Addr. 2
52		17	Addr. 3
51		36	WR#
50		9	RD#
48 (CS1)		7	CF.CS#
	GND	1, 50	Power (0V)
	GND	8, 10..12, 14..16	A10, A9..7, A6..4
	GND	39, 41	CSEL, RESET
	VCC	13, 38	Power (3.3V)
	VCC	32, 34, 35, 44	CE2#, IOR#, IOW#, REG#
	NC	47..49, 27..31	D8..10, D11..15
	NC	26, 25	CD1#, CD2#
	NC	24, 33, 37, 40, 42, 43, 45, 46	WP, VS1, RDY/BSY, VS2, WAIT#, INPACK#, BVD2, BVS1

Table 7: CF-Interface Pin Usage

Note: To use our standard Compact Flash device driver for the DNP/1110 make sure that CF.CS# (Pin 7 of Compact Flash) is connected to CS1.

This interface does not support the so-called “hot plug in” mode. To use this mode a special logic is needed. Plugging cards into the card cage with the power on will usually not cause a problem but you shouldn’t do this. However, the card may be damaged if the right sequence of pins contacts as the card is pushed into the socket. This may damage chips and they may become hot when power is applied. This is one of the most common failures of expansion cards**.**

Appendix 5: GNU General Public License

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