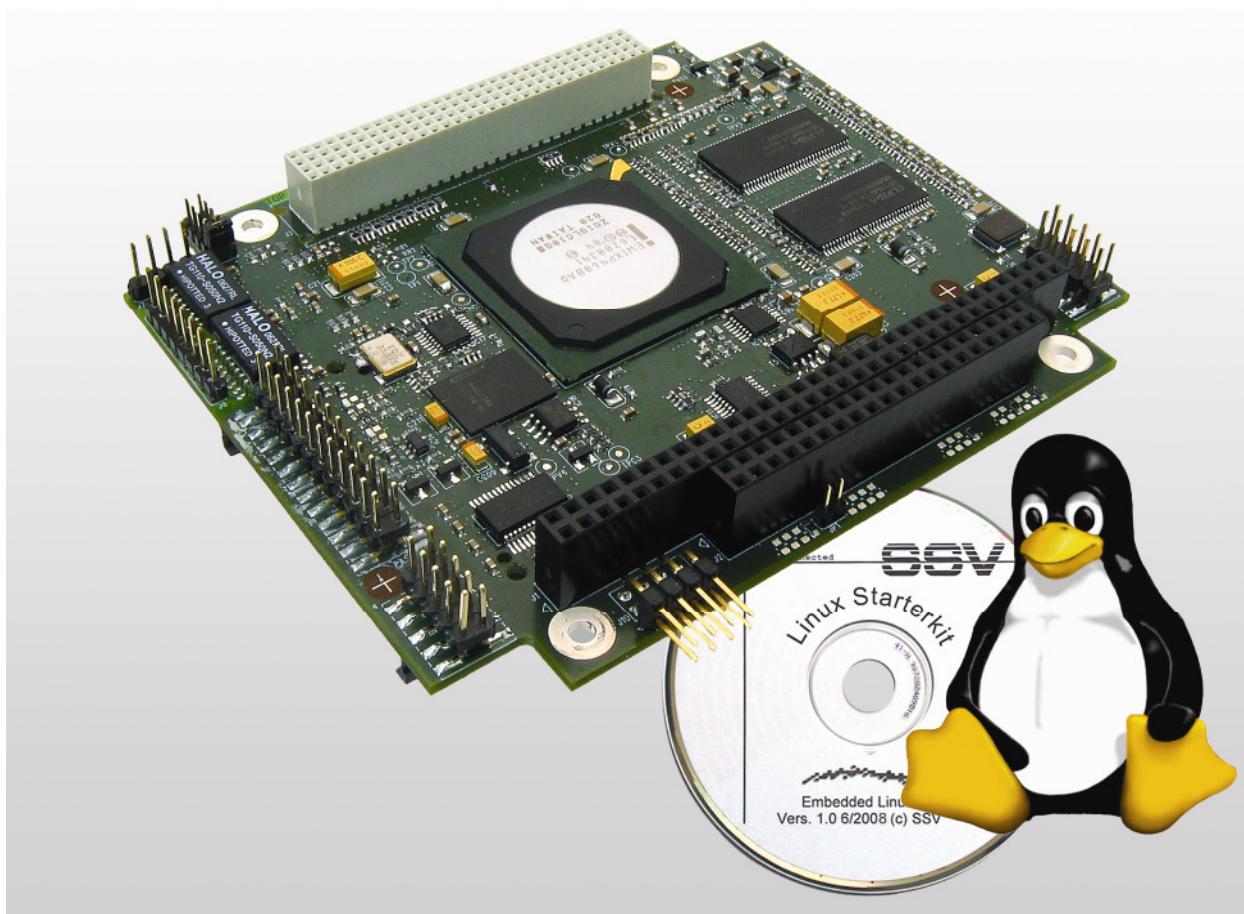


CP/465-SK1

PC/104-Plus Starter Kit

First Steps



SSV Embedded Systems

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1 INTRODUCTION

The CP/465-SK1 Starter Kit contains everything you need to get started with your Intel IXP465 ARM-based embedded networking application. The Starter Kit includes a CP/465 PC/104-Plus board with a pre-installed RedBoot boot loader and an embedded Linux, power supply, serial interface cables, a CD-ROM with software and documentation and a printed user manual for the first steps with the Starter Kit.

For using the CP/465-SK1 you need a PC with one free RS232 (COM) serial port, a 10/100 Mbps Ethernet LAN interface and TCP/IP protocol support as a development system.

The Starter Kit CD-ROM comes with a full GNU cross tool chain for C/C++ software development. The binary files of this pre-build tool chain can be used on a Linux-based PC (SuSE, Red Hat or other) or a Windows XP-based PC together with the Cygwin emulation environment. The cross tool chain build executable files for the Intel IXP465 ARM-based microcontroller from C/C++ source files.

1.1 Safety Guidelines

Please read the following safety guidelines carefully! In case of property or personal damage by not paying attention to this document and/or by incorrect handling, we do not assume liability. In such cases any warranty claim expires.



ATTENTION: Observe precautions for handling – electrostatic sensitive device!

- Discharge yourself before you work with the device, e.g. by touching a heater of metal, to avoid damages.
- Stay grounded while working with the device to avoid damage through electrostatic discharge.

1.2 Conventions

Convention	Usage
bold	Important terms
<i>italic</i>	Filenames, user inputs
<code>monospace</code>	Pathnames, program code, command lines

Table 1: Conventions used in this Document

1.3 Features and Technical Data

The CP/465 comes with a pre-installed RedBoot boot loader and an Embedded Linux operating system. The CP/465 Linux consists of two main components: 1. the Linux kernel and 2. the root file system.

The CP/465 RedBoot boot loader allows the downloading of new Linux kernel versions and root file systems to the CP/465 RAM and Flash. This in-system programming feature can be used by a simple serial and Ethernet link between the development system and the CP/465.

- CP/465-SK1 with Intel IXP465 ARM MCU @ 533 MHz, 32 MB NOR Flash and 256 Mbytes SDRAM
- 1x CompactFlash (CF) card slot
- 2x 10/100 Mbps Ethernet LAN interface with Auto-MDIX support
- DP83849I Dual-port PHY with port switching and monitoring support
- RedBoot boot loader and Embedded Linux pre-installed in Flash memory
- Null modem cable
- 110 VAC or 230 VAC to 5 VDC international power supply
- CD-ROM with user manual and hardware/programmers manuals
- Embedded Linux with source
- GNU cross tool chain for C/C++ software development for Linux-based PCs or Windows XP-based PCs together with the Cygwin emulation environment
- GNU gdb and gdbserver for Ethernet-based remote debugging
- Linux remote login with Telnet
- Web server setup sample
- FTP server setup sample
- Many source code samples

2 GETTING STARTED

2.1 Serial Link between CP/465-SK1 and PC

Setup the serial link between the CP/465-SK1 and your PC. Use a serial interface cable and the null modem cable for this connection.

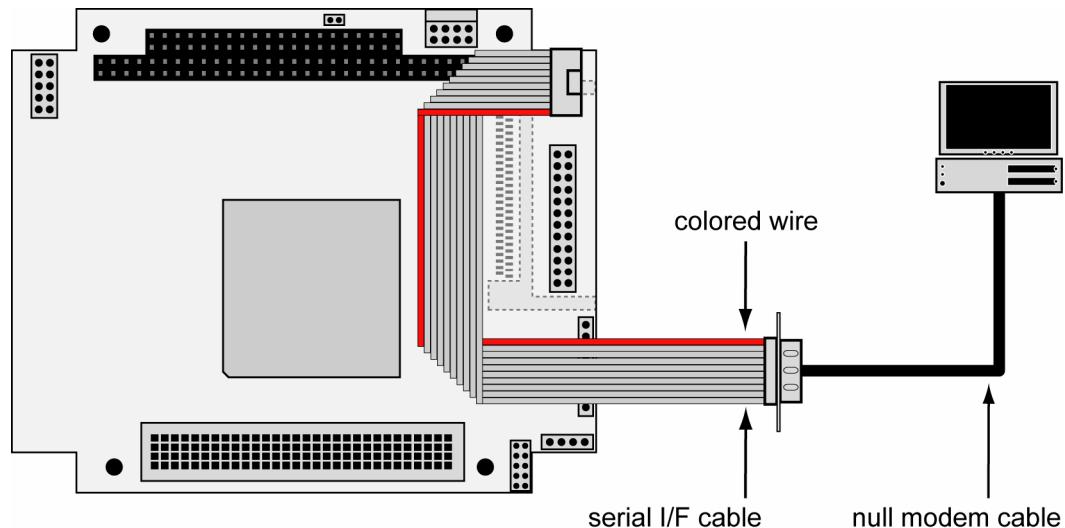


Fig. 1: Serial link between CP/465-SK1 and PC

First connect one end of the serial interface cable with COM1 port of the CP/465. Then connect the serial interface cable over the null modem cable with an unused RS232 COM port of the PC. Make sure that this PC RS232 COM port supports 115.200 bps.

2.2 Ethernet Link between CP/465-SK1 and PC

Setup the Ethernet LAN link between the LAN1 connector of the CP/465-SK1 and your PC. Use the LAN interface cable and an Ethernet cross-over cable or a switch-based infrastructure with patch cable for the LAN connection.

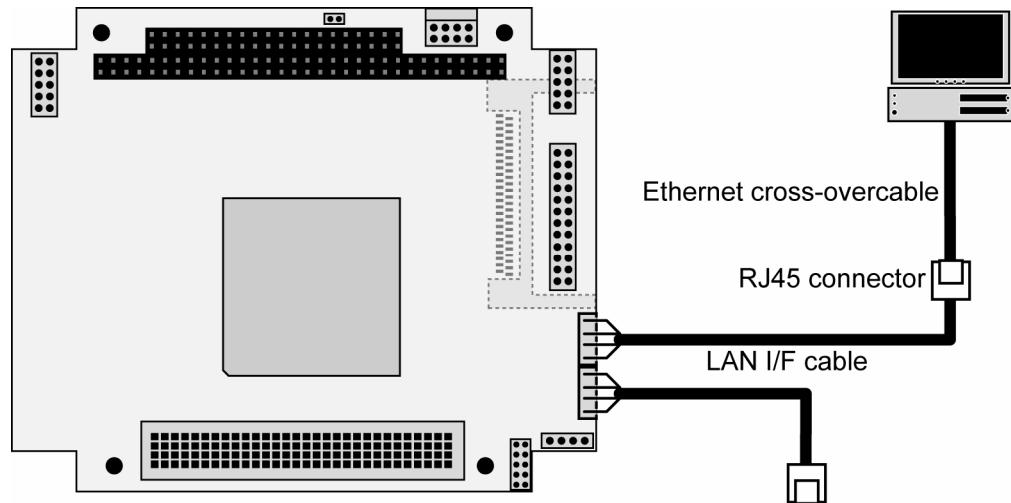


Fig. 2: Ethernet link between CP/465-SK1 and PC



Please note: The CP/465-SK1 comes with the default IP address **192.168.0.126** for the first LAN interface. Please make sure that your PC can work with the IP address range 192.168.0.x.

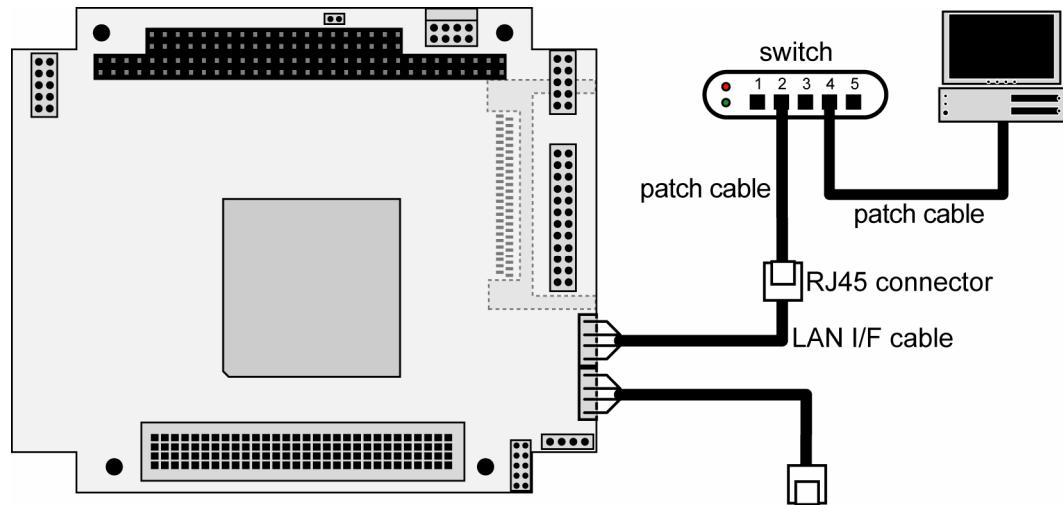


Fig. 3: Switch-based Ethernet link between CP/465-SK1 and PC

2.3 Connecting Power Supply and Power-up the CP/465-SK1

The CP/465-SK1 needs a supply voltage of 5 VDC. For the power supply a power cable as well as a 5 VDC power supply is included in the scope of delivery of the Starter Kit.

The power cable owns a 7-pin female DIN connector at one side and a 10-pin female connector with a plastic case at the other end. Please connect the 10-pin female connector with the corresponding plug connector at the CP/465.

Please note absolutely that there is a connection designation in the plastic mold of the 10-pin plug socket. This designation must show above.

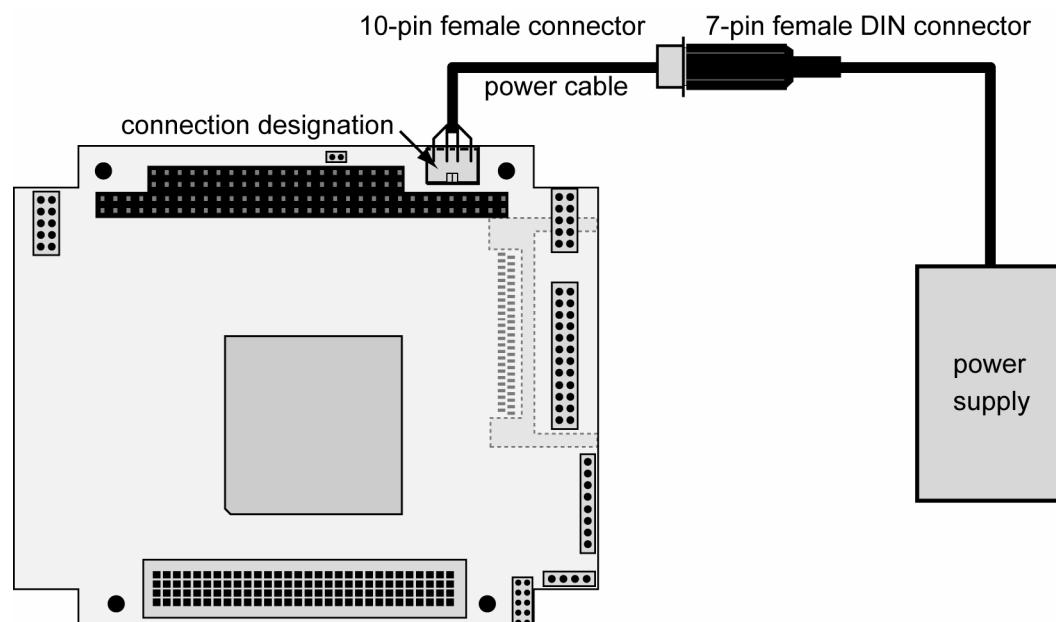


Fig. 4: Power supply for the CP/465-SK1



CAUTION: Providing the CP/465-SK1 with a voltage higher than the regular 5 VDC $\pm 5\%$ could result in damaged board components!

Please note: Make sure that all cable connections are OK. Then power-up the Starter Kit.

2.4 Using Serial Link with Terminal Program

Run *HyperTerminal* on your Windows-PC, *minicom* or a similar simple terminal emulation program on your Linux-based PC.



Fig. 5: Direct connection setup with HyperTerminal

Setup a direct connection with the parameters of table 2. Make sure, that the PC RS-232 COM port supports 115.200 bps.



Fig. 6: Parameter setup with HyperTerminal

Parameter	Value
Speed	115.200 bps
Data Bits	8
Parity	None
Stop Bits	1
Protocol	No (Xon/Xoff, RTS/CTS or similar)

Table 2: Setup parameters for the serial link

2.5 Power-up CP/465-SK1 with RCM disabled

After power-up the CP/465-SK1 starts an automatic boot process from the on-board flash memory chip. This process consists of two steps:

1. Directly after power-up, the CP/465 runs the RedBoot boot loader. This boot loader initializes the hardware components and starts the Linux O/S image. With RCM disabled, there is **no message output** from the RedBoot boot loader over the CP/465 serial ports.
2. Linux takes control over the CP/465 hardware and runs all necessary processes for coming up to live. With RCM disabled, there is **no boot message output** over the CP/465 serial ports.

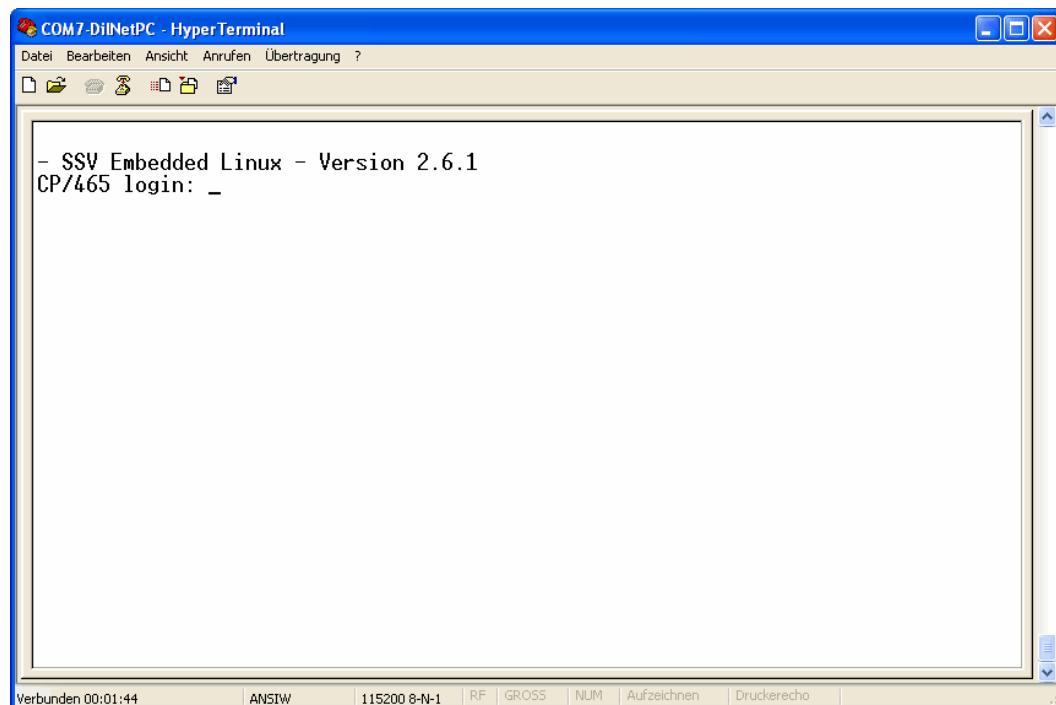


Fig. 7: Linux booting process with HyperTerminal (RCM disabled)

The CP/465-SK1 Linux supports a serial console. It allows running a Linux-based system in a headless configuration without a monitor or keyboard. Wait until the Linux boot process finishes. Just hit enter to use the serial console. Then enter the user name **root** and the password **root**.

2.6 Power-up CP/465-SK1 with RCM enabled

The CP/465-SK1 boot sequence with RCM enabled is similar to the boot procedure with RCM disabled. In this state the boot loader and O/S are using the serial interface for message output.

1. Directly after power-up, the CP/465 runs the RedBoot boot loader. This boot loader initializes the hardware components and starts the Linux O/S image. With RCM enabled the RedBoot boot loader **output some messages** over the CP/465 serial ports.
2. Linux takes control over the CP/465 hardware and runs all necessary processes for coming up to live. With RCM enabled the Linux O/S **shows some messages** the CP/465 serial ports.

```

Starting modutils Loading modules:
ixp4xx_mac - ixp4xx_mac driver 0.3.1: eth0 on NPE-B with PHY[0] initialized
ixp4xx_mac driver 0.3.1: eth1 on NPE-C with PHY[1] initialized
ixp4xx_mac driver 0.3.1: eth2 on NPE-A with PHY[2] initialized
swapped image found
Image loaded to NPE-B Func:0, Rel: 2:1, Status: 82c00000
swapped image found
Image loaded to NPE-C Func:0, Rel: 2:1, Status: 82800000

Starting flash
Starting autoinit eth0: link down
Starting network eth1: link down
Starting inetd: inetd
Starting time
Starting syslog
Starting httpd
Starting console
Starting autostart

- SSV Embedded Linux - Version 2.6.1
CP/465 login:

```

Fig. 8: Linux booting process with HyperTerminal (RCM enabled)

The CP/465-SK1 Linux supports a serial console. It allows running a Linux-based system in a headless configuration without a monitor or keyboard. Wait until the Linux boot process finishes. Then enter the user name **root** and the password **root**.



Please note: It is possible to interrupt the RedBoot loader within the first seconds with CTRL + C. This allows you to entering the RedBoot command line interface (CLI).

2.7 Checking IP Address of PC

Make sure that your PC is using the right IP address for the Ethernet-based TCP/IP communication with the CP/465-SK1. Please use 192.168.0.1 or 192.168.0.254 for your PC and 192.168.0.126 for the CP/465-SK1.



```
Eingabeaufforderung
Microsoft Windows XP [Version 5.1.2600]
(C) Copyright 1985-2001 Microsoft Corp.

C:\Dokumente und Einstellungen\kdw>ipconfig

Windows-IP-Konfiguration

Ethernetadapter LAN-Verbindung:
  Verbindungsspezifisches DNS-Suffix: 192.168.0.254
  IP-Adresse . . . . . : 192.168.0.254
  Subnetzmaske . . . . . : 255.255.255.0
  Standardgateway . . . . . : 192.168.0.254

C:\Dokumente und Einstellungen\kdw>
```

Fig. 9: Windows-PC IP address check with *ipconfig*

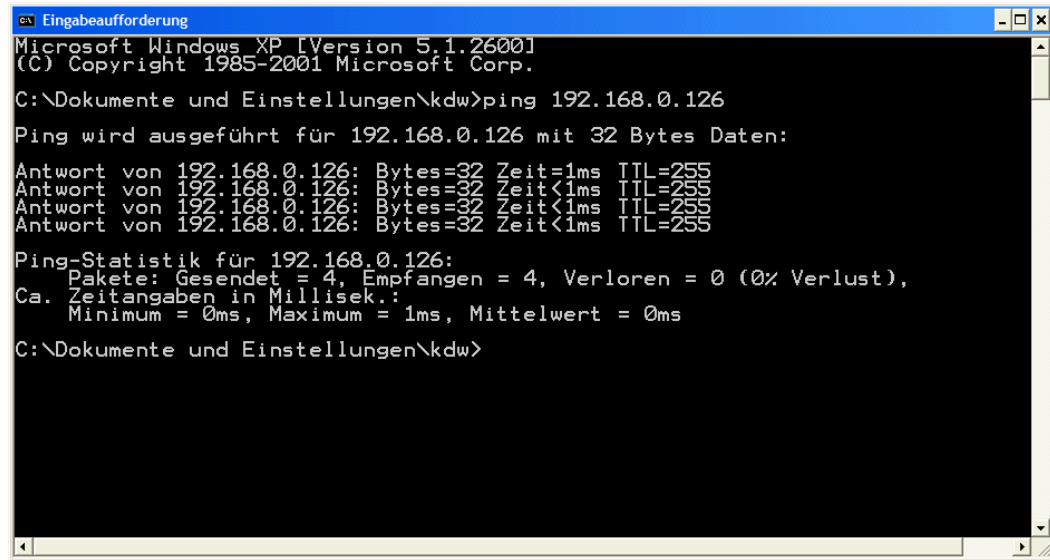
Talk to your network administrator if you have problems with the IP address understanding.



Please note: The CP/465-SK1 comes with the default IP address **192.168.0.126** for the first LAN interface.

2.8 Checking Ethernet-based TCP/IP Communication

Check the Ethernet-based TCP/IP communication between the CP/465-SK1 and the PC with a simple *ping* command.



```
cmd Eingabeaufforderung
Microsoft Windows XP [Version 5.1.2600]
(C) Copyright 1985-2001 Microsoft Corp.

C:\Dokumente und Einstellungen\kdw>ping 192.168.0.126
Ping wird ausgeführt für 192.168.0.126 mit 32 Bytes Daten:
Antwort von 192.168.0.126: Bytes=32 Zeit=1ms TTL=255
Antwort von 192.168.0.126: Bytes=32 Zeit<1ms TTL=255
Antwort von 192.168.0.126: Bytes=32 Zeit<1ms TTL=255
Antwort von 192.168.0.126: Bytes=32 Zeit<1ms TTL=255

Ping-Statistik für 192.168.0.126:
Pakete: Gesendet = 4, Empfangen = 4, Verloren = 0 (0% Verlust),
Ca. Zeitangaben in Millisek.:
    Minimum = 0ms, Maximum = 1ms, Mittelwert = 0ms

C:\Dokumente und Einstellungen\kdw>
```

Fig. 10: Windows-PC TCP/IP communication check with *ping*

First check the cable connections and then the IP addresses if your ping does not work. Then check the TCP/IP setup of your PC.

2.9 Using a Telnet Connection

Run a Telnet client program on your PC with the IP address of the CP/465-SK1. You can use a Telnet session for remote entering Linux commands.

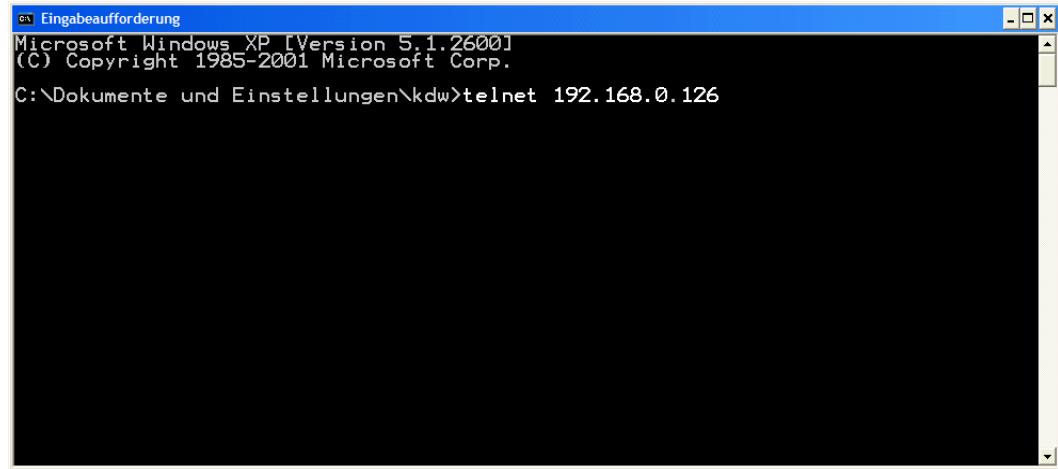


Fig. 11: Run the Windows Telnet client program

Wait until the CP/465-SK1 Linux requests a user name. Please enter the user name **root** and the password **root**.

After a successful login it is possible to enter and execute Linux commands. Please use the *help* command to find out which commands are available.

A screenshot of a Telnet session window titled 'Telnet 192.168.0.126'. The user has logged in as 'root'. The session shows the user running several Linux commands: 'ps', 'top', and 'ls -al /'. The output of these commands is displayed in the window.

Fig. 12: Using Linux commands within a Telnet client window

Please note: The CP/465-SK1 Linux comes with *BusyBox*. All Linux command line commands are implemented in *BusyBox*. *BusyBox* combines tiny versions of many common UNIX utilities into a single small executable. It provides replacements for most of the utilities you usually find in GNU *fileutils*, *shellutils*, etc. The utilities in *BusyBox* generally have fewer options than their full-featured GNU cousins; however, the options that are included provide the expected functionality and behave very much like their GNU counterparts. *BusyBox* provides a fairly complete environment for any small or embedded system.

```

ls -al
total 124
drwxr-xr-x 1 root root 2048 Mar 26 2008 .
drwxr-xr-x 1 root root 576 Apr 9 2008 ..
lrwxrwxrwx 1 root root 9 Apr 9 2008 addgroup -> tinylogin
lrwxrwxrwx 1 root root 9 Apr 9 2008 adduser -> tinylogin
-rw-r--r-- 1 root root 341024 Mar 13 2000 bash
-rw-r--r-- 1 root root 405488 Mar 25 2008 busybox
lrwxrwxrwx 1 root root 7 Apr 9 2008 cat -> busybox
lrwxrwxrwx 1 root root 7 Apr 9 2008 catv -> busybox
lrwxrwxrwx 1 root root 7 Apr 9 2008 chgrp -> busybox
lrwxrwxrwx 1 root root 7 Apr 9 2008 chmod -> busybox
lrwxrwxrwx 1 root root 7 Apr 9 2008 chown -> busybox
lrwxrwxrwx 1 root root 7 Apr 9 2008 cp -> busybox
lrwxrwxrwx 1 root root 7 Apr 9 2008 date -> busybox
lrwxrwxrwx 1 root root 7 Apr 9 2008 dd -> busybox
lrwxrwxrwx 1 root root 9 Apr 9 2008 delgroup -> tinylogin
lrwxrwxrwx 1 root root 9 Apr 9 2008 deluser -> tinylogin
lrwxrwxrwx 1 root root 7 Apr 9 2008 df -> busybox
lrwxrwxrwx 1 root root 7 Apr 9 2008 dmesg -> busybox
lrwxrwxrwx 1 root root 7 Apr 9 2008 echo -> busybox
lrwxrwxrwx 1 root root 7 Apr 9 2008 false -> busybox
lrwxrwxrwx 1 root root 7 Apr 9 2008 fgrep -> busybox
lrwxrwxrwx 1 root root 7 Apr 9 2008 grep -> busybox
lrwxrwxrwx 1 root root 7 Apr 9 2008 gunzip -> busybox
lrwxrwxrwx 1 root root 7 Apr 9 2008 gzip -> busybox
lrwxrwxrwx 1 root root 7 Apr 9 2008 hostname -> busybox
lrwxrwxrwx 1 root root 7 Apr 9 2008 ipcalc -> busybox
lrwxrwxrwx 1 root root 7 Apr 9 2008 kill -> busybox
lrwxrwxrwx 1 root root 7 Apr 9 2008 ln -> busybox
lrwxrwxrwx 1 root root 9 Apr 9 2008 login -> tinylogin
lrwxrwxrwx 1 root root 7 Apr 9 2008 ls -> busybox
lrwxrwxrwx 1 root root 7 Apr 9 2008 mkdir -> busybox
lrwxrwxrwx 1 root root 7 Apr 9 2008 mknod -> busybox
lrwxrwxrwx 1 root root 7 Apr 9 2008 mktemp -> busybox
lrwxrwxrwx 1 root root 7 Apr 9 2008 more -> busybox
lrwxrwxrwx 1 root root 7 Apr 9 2008 mount -> busybox
lrwxrwxrwx 1 root root 7 Apr 9 2008 mv -> busybox
lrwxrwxrwx 1 root root 7 Apr 9 2008 netstat -> busybox
lrwxrwxrwx 1 root root 7 Apr 9 2008 nice -> busybox
lrwxrwxrwx 1 root root 7 Apr 9 2008 pidof -> busybox
lrwxrwxrwx 1 root root 7 Apr 9 2008 ping -> busybox
lrwxrwxrwx 1 root root 7 Apr 9 2008 ping6 -> busybox
lrwxrwxrwx 1 root root 7 Apr 9 2008 printenv -> busybox
lrwxrwxrwx 1 root root 7 Apr 9 2008 ps -> busybox
lrwxrwxrwx 1 root root 7 Apr 9 2008 pwd -> busybox
lrwxrwxrwx 1 root root 7 Apr 9 2008 rm -> busybox
lrwxrwxrwx 1 root root 7 Apr 9 2008 rmdir -> busybox
lrwxrwxrwx 1 root root 7 Apr 9 2008 run-parts -> busybox
lrwxrwxrwx 1 root root 7 Apr 9 2008 sed -> busybox
lrwxrwxrwx 1 root root 4 Apr 9 2008 sh -> bash
lrwxrwxrwx 1 root root 7 Apr 9 2008 sleep -> busybox
lrwxrwxrwx 1 root root 7 Apr 9 2008 stat -> busybox
lrwxrwxrwx 1 root root 7 Apr 9 2008 stty -> busybox

```

Fig. 13: *BusyBox* is a executable within the */bin* directory

2.10 Checking Embedded Web Server

The CP/465 default Linux configuration comes with a pre-installed embedded web server. This server allows to changing some system parameters over a web-based user interface.

Run your PC web browser and access the login page with your browser. Use the URL <http://192.168.0.126>. This URL assumes that your CP/465-SK1 is using the IP address 192.168.0.126 for the Ethernet LAN interface LAN1. Change this IP address if necessary.



Fig. 14: The CP/465-SK1 web interface *Login* page

Please enter the login name ***cp465*** and click the *Submit* button within your browser window.

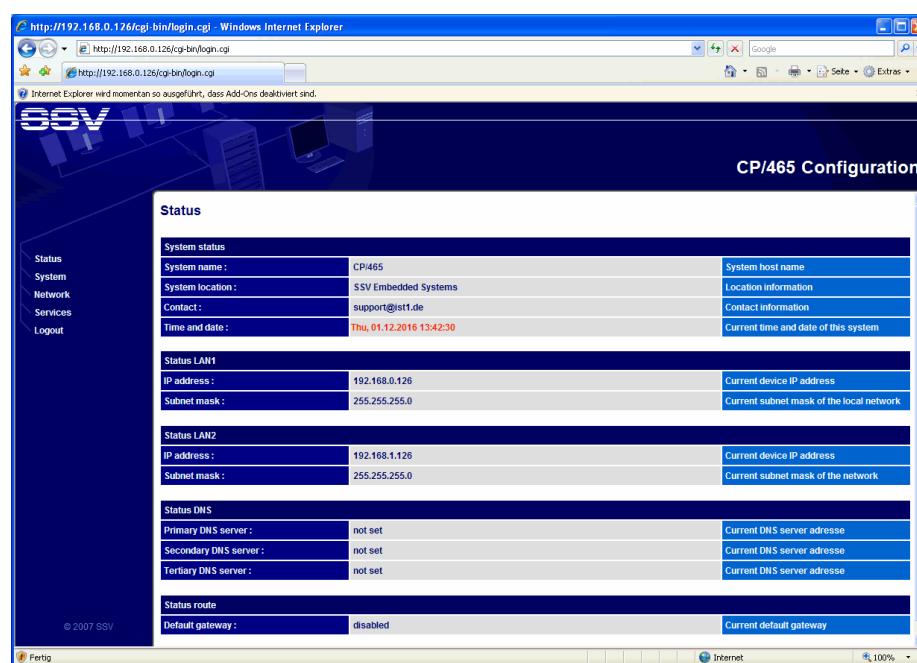


Fig. 15: The CP/465-SK1 web interface *Status* page

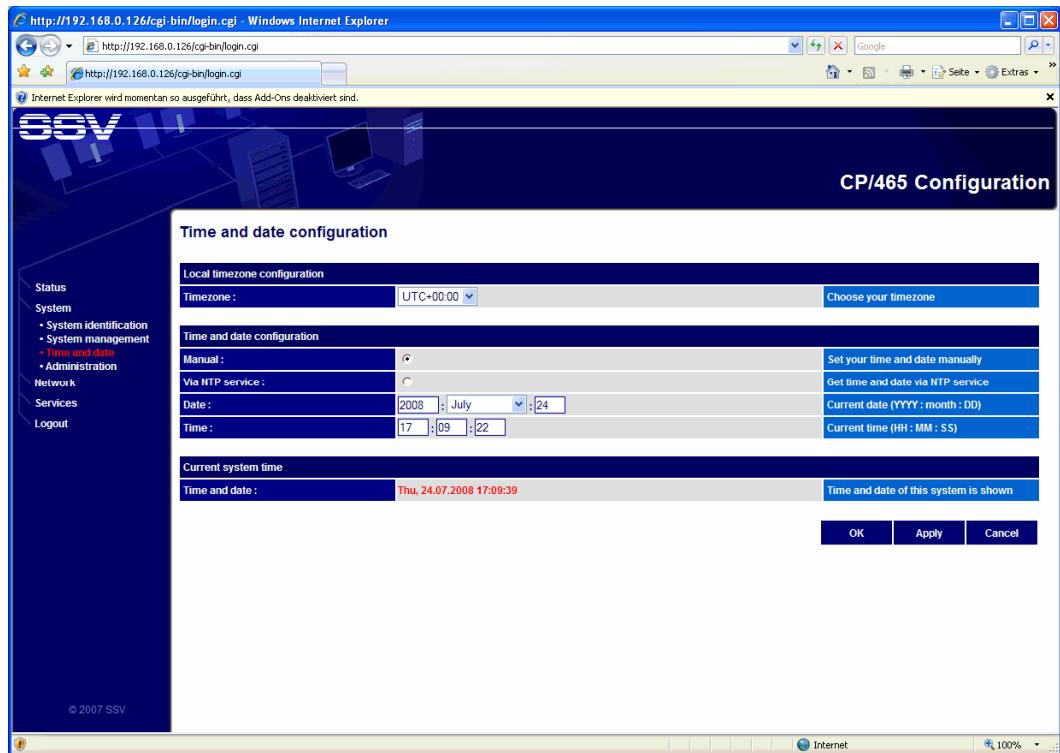


Fig. 16: The CP/465-SK1 web interface *Time and date configuration* page



Please note: The CP/465 web interface allows only one user login from one system at one time. Please logout from the web interface before another user can login.

2.11 Checking FTP Server

The CP/465 Linux comes with a pre-installed FTP server. This server allows the file transfer between a PC and the CP/465-SK1.

Run an FTP client program on your PC. Set the session parameters for your FTP client to IP address **192.168.0.126**, user name **root** and password **root**.

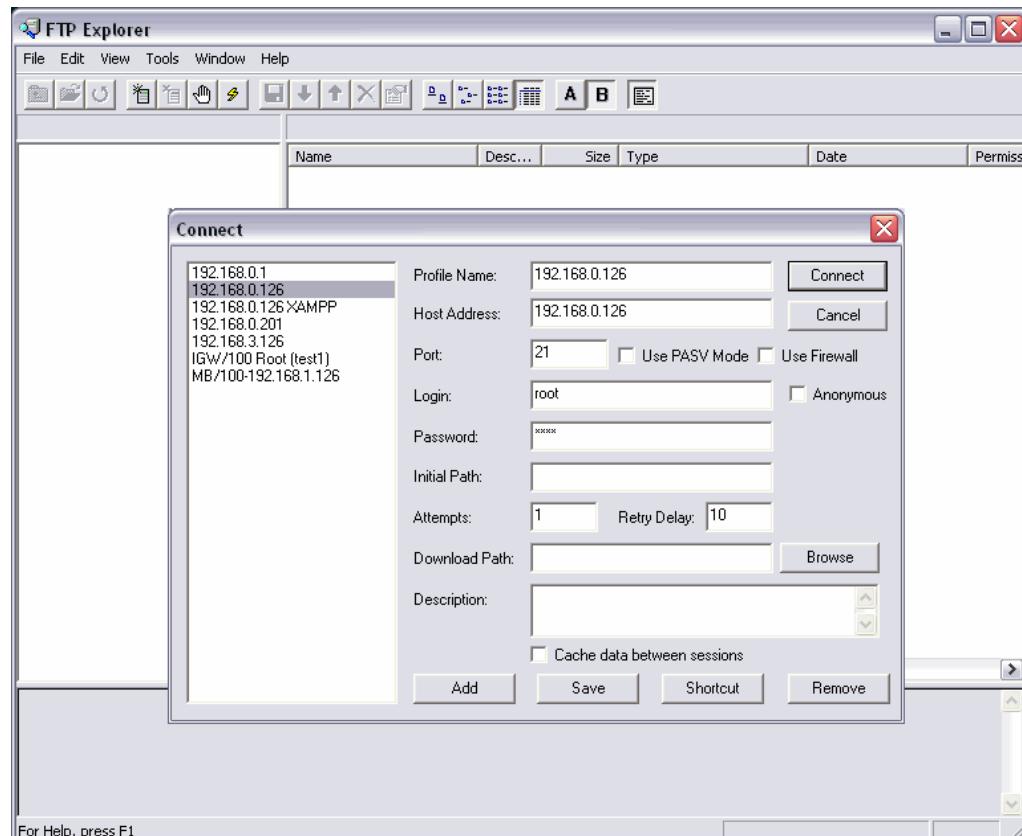


Fig. 17: Set the session parameters for an FTP client program

Connect your FTP client with the CP/465 FTP server. Then navigate to the directory `/home/user` and transfer some file (Upload Files) to the CP/465-SK1.

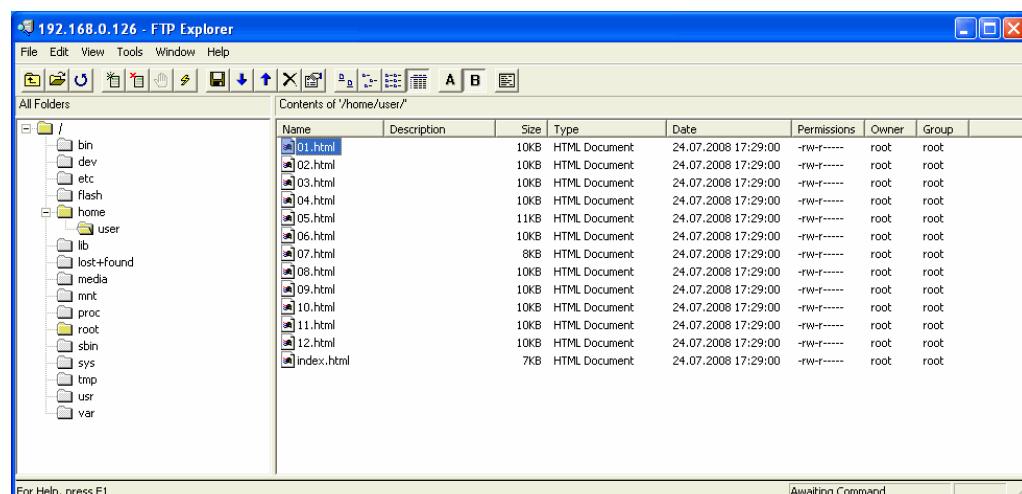
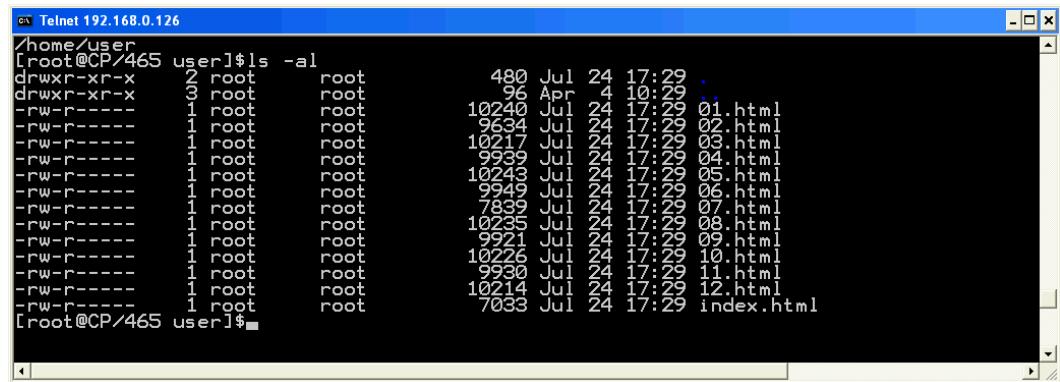


Fig. 18: Transfer some files to the CP/465-SK1

Check the new files with a Telnet session. Change to the CP/465 directory /home/user within your Telnet session.



```
ex Telnet 192.168.0.126
/home/user
[root@CP/465 user]$ls -al
drwxr-xr-x    2 root      root          480 Jul 24 17:29 .
drwxr-xr-x    3 root      root          96  Apr  4 10:29 ..
-rw-r-----   1 root      root         10240 Jul 24 17:29 01.html
-rw-r-----   1 root      root          9634 Jul 24 17:29 02.html
-rw-r-----   1 root      root          10217 Jul 24 17:29 03.html
-rw-r-----   1 root      root          9939 Jul 24 17:29 04.html
-rw-r-----   1 root      root          10243 Jul 24 17:29 05.html
-rw-r-----   1 root      root          9949 Jul 24 17:29 06.html
-rw-r-----   1 root      root          7839 Jul 24 17:29 07.html
-rw-r-----   1 root      root          10235 Jul 24 17:29 08.html
-rw-r-----   1 root      root          9921 Jul 24 17:29 09.html
-rw-r-----   1 root      root          10226 Jul 24 17:29 10.html
-rw-r-----   1 root      root          9930 Jul 24 17:29 11.html
-rw-r-----   1 root      root          10214 Jul 24 17:29 12.html
-rw-r-----   1 root      root          7033 Jul 24 17:29 index.html
[root@CP/465 user]$
```

Fig. 19: The new files within /home/user

2.12 Checking TFTP Client

The CP/465 Linux offers also a pre-installed TFTP client. This program allows the TFTP-based file transfer between a PC and the CP/465-SK1.

First run a TFTP server program on your PC system. Linux-based PCs offer a TFTP server as part of the standard networking feature set. For Windows-based PCs please use the free *Win32 TFTP* server program from the Starter Kit CD-ROM (see directory /TFTP-Server-Win32 at the Starter Kit CD-ROM).



Fig. 20: Running the Win32 TFTP server

Figure 20 shows the free Win32 TFTP server in action. This server allows file transfers to and from any CP/465 directory.

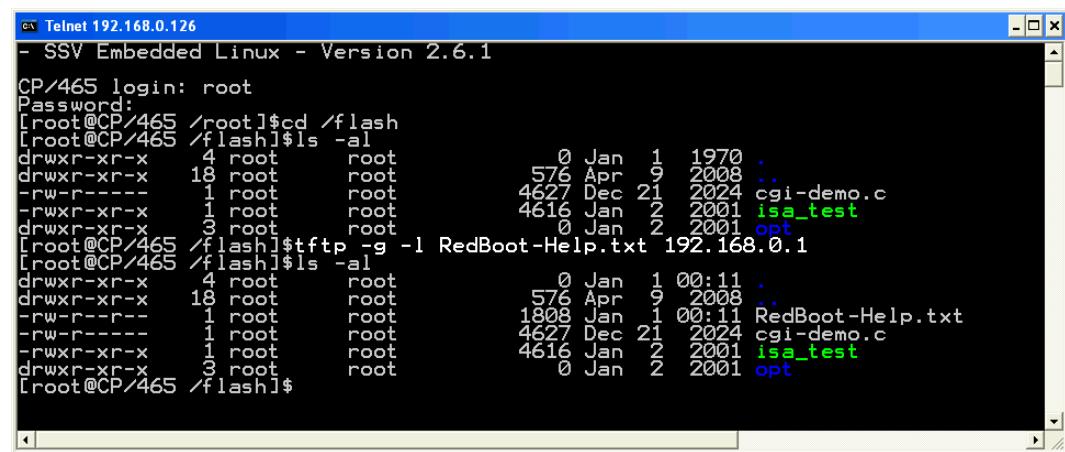


Fig. 21: Download with TFTP get command

Enter your get and put commands within a Telnet session. Figure 21 shows a sample for a TFTP get command (getting a file from the PC to the CP/465-SK1). Here we enter:

tftp -g -l RedBoot-Help.txt 192.168.0.1

RedBoot-Help.txt is the filename which is requested from the TFTP server. **192.168.0.1** is the TFTP server IP address.

2.13 Changing Ex Factory IP Address (web-based)

The ex factory value for the default IP address is **192.168.0.126**. The network mask for this address is **255.255.255.0**. You can change the IP address and the network mask over an Ethernet-based LAN link with the CP/465-SK1 IPbyNET feature (see chapter 2.14 for more details) or with a web browser.

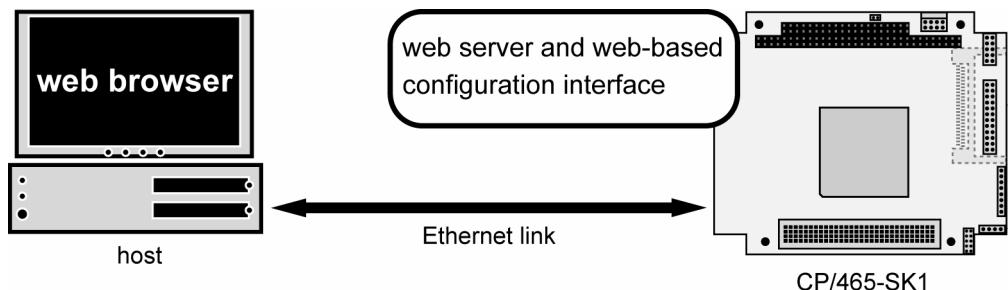


Fig. 22: Environment for web-based IP address change

Run a web browser on your PC and enter the URL <http://192.168.0.126> (the ex factory IP address of the CP/465-SK1).



Fig. 23: Login screen of the web-based configuration interface

Then enter the login password **cp465** and click the **Submit** button.

Please note: The CP/465-SK1 web-based configuration interface allows only one login user at the same time.



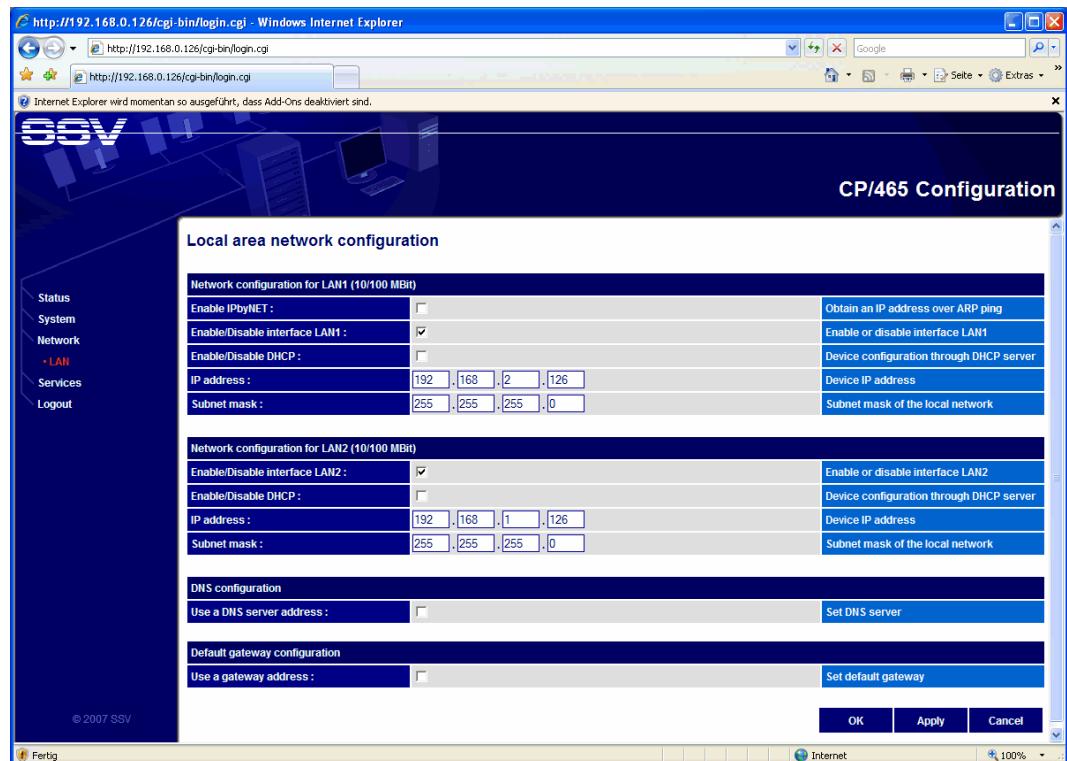


Fig. 24: The LAN configuration allows to change the IP address

Click the menu item **Network** and then the sub-menu item **LAN**. Enter the new IP address and the network mask (e.g. the IP address 192.168.2.126). Then click the **Apply** button. Finally close the browser window and check the new IP address with a *ping*.

```
C:\>ping 192.168.2.126
Ping wird ausgeführt für 192.168.2.126 mit 32 Bytes Daten:
Antwort von 192.168.2.126: Bytes=32 Zeit<1ms TTL=64
Ping-Statistik für 192.168.2.126:
Pakete: Gesendet = 4, Empfangen = 4, Verloren = 0 (0% Verlust),
Ca. Zeitangaben in Millisek.:
Minimum = 0ms, Maximum = 0ms, Mittelwert = 0ms
C:\>
```

Fig. 25: Checking the new IP address with *ping*



Please note: Do not forget to change the IP address of your PC to 192.168.2.1 or similar.

The LAN configuration screen shown in figure 24 allows also enabling a DHCP mode (obtaining an IP address automatically). In this mode the CP/465-SK1 is automatically assigned an IP address on DHCP-enabled networks. If DHCP does not work (e.g. no DHCP server available), the CP/465-SK1 takes its default IP address.

2.14 Changing Ex Factory IP Address (IPbyNet)

The ex factory value for the default IP address is **192.168.0.126**. The network mask for this address is **255.255.255.0**. You can change the IP address and the network mask over an Ethernet-based LAN link with a web browser (see chapter 2.13 for more details) or with the CP/465-SK1 IPbyNET feature.

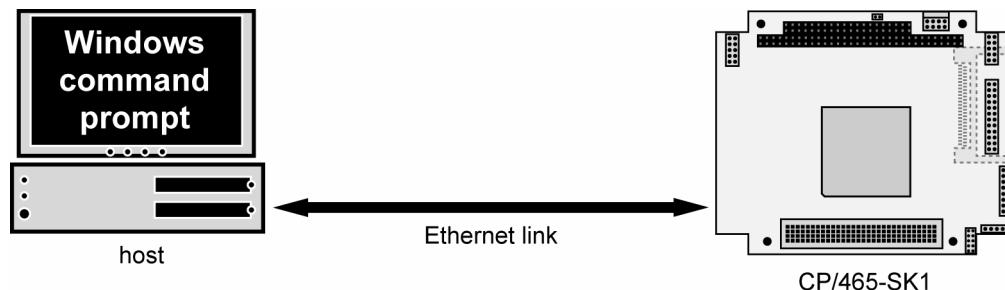


Fig. 26: Environment for IP address change with IPbyNet

IPbyNET is a CP/465-SK1 firmware competent, which checks direct after each boot process the presence of ICMP echo request packets with the MAC address of the CP/465-SK1 Ethernet LAN interface. If an ICMP packet is available, the IPbyNET firmware extracts the destination IP address from the ICMP echo request packet and sets the CP/465-SK1 Ethernet LAN interface with this IP address.

```
C:\>ping -t -w 300 192.168.0.10
C:\>ping 192.168.0.126
Ping wird ausgeführt für 192.168.0.126 mit 32 Bytes Daten:
Antwort von 192.168.0.126: Bytes=32 Zeit<1ms TTL=64
Ping-Statistik für 192.168.0.126:
Pakete: Gesendet = 4, Empfangen = 4, Verloren = 0 (0% Verlust),
Ca. Zeitangaben in Millisek.:
    Minimum = 0ms, Maximum = 0ms, Mittelwert = 0ms
C:\>arp -s 192.168.0.10 02-80-AD-20-D3-7F
C:\>ping -t -w 300 192.168.0.10
Ping wird ausgeführt für 192.168.0.10 mit 32 Bytes Daten:
Zeitüberschreitung der Anforderung.
Antwort von 192.168.0.10: Bytes=32 Zeit=2ms TTL=64
Antwort von 192.168.0.10: Bytes=32 Zeit<1ms TTL=64
```

Fig. 27: Changing the IP address with IPbyNet

Please see the label with the MAC address of the CP/465-SK1 on the top of your DIL/NetPC device to find the MAC address for your CP/465-SK1. Then run a Windows command prompt and enter the following two command lines:

**arp -s 192.168.0.10 02-80-AD-20-D3-7F
ping -t -w 300 192.168.0.10**

The first command line creates an ARP table entry for the IP address 192.168.0.10 and the MAC address 02-80-AD-20-D3-7F. The second command line sends an ICMP echo request to the device with the MAC address 02-80-AD-20-D3-7F. This request contains the new IP address 192.168.0.10.

Change the IP address and the MAC address of the two command lines. Use the IP address of your needs and the given MAC address from your CP/465-SK1.

Then reboot the CP/465-SK1. After a few seconds the CP/465-SK1 responds to the *ping* with the new IP address.

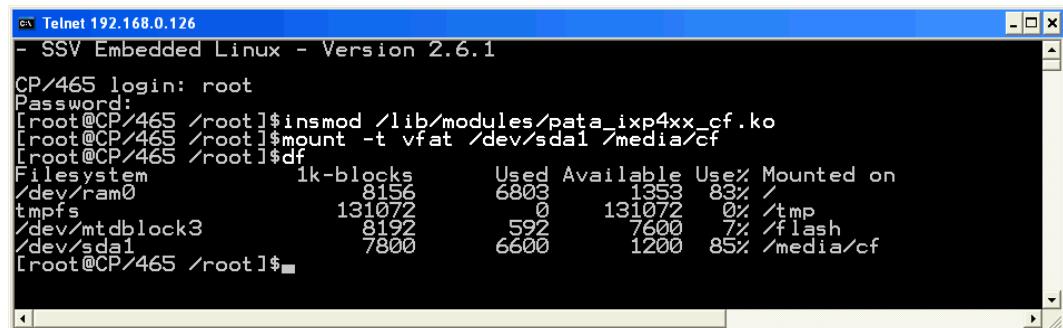


Please note: Changing the IP address of your CP/465-SK1 with IPbyNET resets also the web-based configuration interface settings to factory defaults!

2.15 CompactFlash Card Mounting

Turn off the CP/465-SK1 and insert your CF card into the CF card slot. Boot the CP/465-SK1 and execute the following commands after the login (like shown in the following figure):

```
insmod /lib/modules/pata_ixp_4xx_cf.ko
mount -t vfat /dev/sdal /media/cf
df
```



The screenshot shows a Telnet session titled "Telnet 192.168.0.126". The session is connected to an SSV Embedded Linux system, Version 2.6.1. The user is logged in as root. The terminal window displays the following command sequence and output:

```
- SSV Embedded Linux - Version 2.6.1
CP/465 login: root
Password:
[root@CP/465 ~]# insmod /lib/modules/pata_ixp4xx_cf.ko
[root@CP/465 ~]# mount -t vfat /dev/sdal /media/cf
[root@CP/465 ~]# df
Filesystem      1k-blocks    Used   Available  Use% Mounted on
/dev/ram0        8156      6803     1353  83% /
tmpfs           131072       0     131072  0% /tmp
/dev/mtdblock3   8192      592     7600  7% /flash
/dev/sdal        7800      6600     1200  85% /media/cf
[root@CP/465 ~]#
```

Fig. 28: Mounting a CompactFlash card

3 REDBOOT COMMAND OVERVIEW

The user interface to RedBoot consists of a command line interpreter (CLI), much like a Linux shell prompt. When connected via a serial line you can interactively enter commands and see the results. The following table shows the available RedBoot commands for the CP/465-SK1.

3.1 Common RedBoot Commands

Command	Function
alias	Manage aliases kept in FLASH memory
baudrate	Set/Query the system console baud rate
channel	Display/switch console channel
cksum	Compute a 32bit checksum [POSIX algorithm] for a range of memory
dump	Display (hex dump) a range of memory
exec	Execute an image - with MMU off
fis	Manage Flash images
fconfig	Manage configuration kept in FLASH memory
Go	Execute code at a location
help	Display help on available commands
history	Display command history
ip_address	Set/change IP addresses
load	Load a file
mcmp	Compare two blocks of memory
mcopy	Copy memory from one address to another
mfll	Fill a block of memory with a pattern
ping	Network connectivity test
reset	Reset the system
swab	Swap bytes in 16-bit or 32-bit words in a block of memory
version	Display RedBoot version information
x	Display (hex dump) a range of memory

Table 3: Common RedBoot command overview

3.2 Flash Image System (FIS) Commands

Command	Function
fis init	Initialize Flash Image System (FIS)
fis list	List Flash Image System directory
fis free	Free flash image
fis create	Create flash image
fis load	Load flash image
fis delete	Delete flash image
fis lock	Lock flash area
fis unlock	Unlock flash area
fis erase	Erase flash area
fis write	Write flash area

Table 4: Flash Image System (FIS) command overview

3.3 RedBoot Help Messages

RedBoot>help

```

Manage aliases kept in FLASH memory
    alias name [value]
Set/Query the system console baud rate
    baudrate [-b <rate>]
Display/switch console channel
    channel [-1|<channel number>]
Compute a 32bit checksum [POSIX algorithm] for a range of memory
    cksum -b <location> -l <length>
Display (hex dump) a range of memory
    dump -b <location> [-l <length>] [-s] [-1|2|4]
Execute an image - with MMU off
    exec [-w timeout] [-b <load addr> [-l <length>]]
        [-r <ramdisk addr> [-s <ramdisk length>]]
        [-c "kernel command line"] [<entry_point>]
Manage FLASH images
    fis {cmds}
Manage configuration kept in FLASH memory
    fconfig [-i] [-l] [-n] [-f] [-d] | [-d] nickname [value]
Execute code at a location
    go [-w <timeout>] [-c] [-n] [entry]
Help about help?
    help [<topic>]
Display command history
    history
Set/change IP addresses
    ip_address [-l <local_ip_address>[/<mask_len>]] [-h <ser ↴
        ver_address>]
Load a file
    load [-r] [-v] [-d] [-h <host>] [-p <TCP port>] [-m <varies>]
        [-c <channel_number>] [-b <base_address>] <file_name>
Compare two blocks of memory
    mcmp -s <location> -d <location> -l <length> [-1|-2|-4]
Copy memory from one address to another
    mcopy -s <location> -d <location> -l <length> [-1|-2|-4]
Fill a block of memory with a pattern
    mfill -b <location> -l <length> -p <pattern> [-1|-2|-4]
Network connectivity test
    ping [-v] [-n <count>] [-l <length>] [-t <timeout>] [-r <rate>]
        [-i <IP_addr>] -h <IP_addr>
Reset the system
    reset
Swap bytes in 16-bit or 32-bit words in a block of memory
    swab -b <location> -l <length> [-2|-4]
Display RedBoot version information
    version
Display (hex dump) a range of memory
    x -b <location> [-l <length>] [-s] [-1|2|4]

RedBoot>
```



Please note: This symbol “ \leftrightarrow ” shows that the following line belongs to the previous line.

4 REDBOOT BOOT MESSAGES



Please note: This symbol “↔” shows that the following line belongs to the previous line.

```
Trying NPE-C...success. Using NPE-C with PHY 1.  
Ethernet eth1: MAC address 00:03:47:df:32:aa  
IP: 192.168.24.126/255.255.255.0, Gateway: 0.0.0.0  
Default server: 192.168.24.1

RedBoot(tm) bootstrap and debug environment [ROM]  
Red Hat certified release, version 2.04 - built 09:26:50, ↔  
Apr 1 2008

Platform: CP465 Board (IXP4XX) BE  
Copyright (C) 2000, 2001, 2002, 2003, 2004, 2007 Free ↔  
Software Foundation, Inc.

RAM: 0x00000000-0x10000000, [0x00021530-0x0ffc1000] available  
FLASH: 0x50000000 - 0x52000000, 256 blocks of 0x00020000 ↔  
bytes each.  
== Executing boot script in 3.000 seconds - enter ^C to abort  
RedBoot> fis unlock -f 0x503c0000 -l 0x1C40000  
... Unlock from 0x503c0000-0x52000000: ↔  
.....  
.....  
RedBoot> fis load rImage  
RedBoot> fis load zImage  
RedBoot> exec -x -c "console=ttyS0,115200 root=/dev/ram0 ↔  
initrd=0x00800000,8M"  
Using base address 0x00100000 and length 0x0014b840  
Linux version 2.6.22 (root@colinux) (gcc version 3.4.4) #1 ↔  
PREEMPT Fri Jun 20 07:43:43 EDT 2008  
CPU: XScale-IXP46x Family [69054202] revision 2 (ARMv5TE), ↔  
cr=0000397f  
Machine: SSV CP/465 PC/104-Board  
Memory policy: ECC disabled, Data cache writeback  
CPU0: D VIVT undefined 5 cache  
CPU0: I cache: 32768 bytes, associativity 32, 32 byte lines, 32 ↔  
sets  
CPU0: D cache: 32768 bytes, associativity 32, 32 byte lines, 32 ↔  
sets  
Built 1 zonelists. Total pages: 65024  
Kernel command line: console=ttyS0,115200 root=/dev/ram0 ↔  
initrd=0x00800000,8M  
PID hash table entries: 1024 (order: 10, 4096 bytes)  
Dentry cache hash table entries: 32768 (order: 5, 131072 bytes)  
Inode-cache hash table entries: 16384 (order: 4, 65536 bytes)  
Memory: 256MB = 256MB total  
Memory: 248704KB available (2600K code, 171K data, 96K init)  
Mount-cache hash table entries: 512  
CPU: Testing write buffer coherency: ok  
NET: Registered protocol family 16  
IXP4xx: Using 32MiB expansion bus window size  
PCI: IXP4xx is host
```

```

PCI: IXP4xx Using direct access for memory space
PCI: bus0: Fast back to back transfers enabled
SCSI subsystem initialized
NET: Registered protocol family 2
Time: OSTS clocksource has been installed.
IP route cache hash table entries: 2048 (order: 1, 8192 bytes)
TCP established hash table entries: 8192 (order: 4, 65536 bytes)
TCP bind hash table entries: 8192 (order: 3, 32768 bytes)
TCP: Hash tables configured (established 8192 bind 8192)
TCP reno registered
checking if image is initramfs...it isn't (no cpio magic); ↵
looks like an initrd
Freeing initrd memory: 8192K
NetWinder Floating Point Emulator V0.97 (double precision)
JFFS2 version 2.2. (NAND) © 2001-2006 Red Hat, Inc.
io scheduler noop registered
io scheduler anticipatory registered (default)
io scheduler deadline registered
io scheduler cfq registered
Serial: 8250/16550 driver $Revision: 1.90 $ 2 ports, IRQ ↵
sharing disabled
serial8250.0: ttyS0 at MMIO 0xc8000000 (irq = 15) is a XScale
serial8250.0: ttyS1 at MMIO 0xc8001000 (irq = 13) is a XScale
RAMDISK driver initialized: 16 RAM disks of 8192K size 1024 ↵
blocksize
IXP4XX Q Manager 0.2.1 initialized.
IXP4XX NPE driver Version 0.3.0 initialized
CP465-Flash.0: Found 1 x16 devices at 0x0 in 16-bit bank
    Intel/Sharp Extended Query Table at 0x010A
    Intel/Sharp Extended Query Table at 0x010A
Using buffer write method
cfi_cmdset_0001: Erase suspend on write enabled
Creating 5 MTD partitions on "CP465-Flash.0":
0x00000000-0x00060000 : "RedBoot"
0x00060000-0x001c0000 : "Kernel"
0x001c0000-0x004c0000 : "Initrd"
0x004c0000-0x00cc0000 : "Flash1"
0x00cc0000-0x02000000 : "Flash2"
pxa2xx_udc: version 4-May-2005
i2c /dev entries driver
TCP cubic registered
NET: Registered protocol family 1
NET: Registered protocol family 17
XScale DSP coprocessor detected.
RAMDISK: Compressed image found at block 0
VFS: Mounted root (minix filesystem).
Freeing init memory: 96K
INIT: version 2.74 booting

INIT: Entering runlevel: 3

Starting modutils Loading modules:
ixp4xx_mac driver 0.3.1: eth0 on NPE-B with PHY[0] initialized
ixp4xx_mac - ipx4xx_mac driver 0.3.1: eth1 on NPE-C with PHY[1] ↵
initialized

```

```
ixp4xx_mac driver 0.3.1: eth2 on NPE-A with PHY[2] initialized
swapped image found
Image loaded to NPE-B Func:0, Rel: 2:1, Status: 82800000
swapped image found
Image loaded to NPE-C Func:0, Rel: 2:1, Status: 82800000

Starting flash
Starting autoinit eth0: link up, 100Mbps, full-duplex, lpa 0xC5E1

Starting network eth1: link down

Starting inetd: inetd
Starting time
Starting syslog
Starting httpd
Starting console
Starting autostart

- SSV Embedded Linux - Version 2.6.1
CP/465 login:
```

Listing 1: Boot messages with eth0 Ethernet connection

5 HELPFUL LITERATURE

- CP/465 PC/104-Plus Board hardware reference
- IXP465 ARM MCU data sheet (Intel)
- IXP465 ARM MCU developer's manual (Intel)
- IXP465 ARM MCU core developer's manual (Intel)
- DP83849I Dual-port PHY data sheet (National Semiconductor)
- PC/104 specification (www.pc104.org)
- PC/104-Plus specification (www.pc104.org)



Please note: Intel calls the IXP465 ARM MCU core "XScale®". The XScale MCU architecture is ARM-based. The GNU software tools for the CP/465 Linux are also ARM-based.

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For actual information about the CP/465 PC/104-Plus Board visit us at
www.ssv-comm.de.

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1.0	2008-08-18	first version	WBU

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