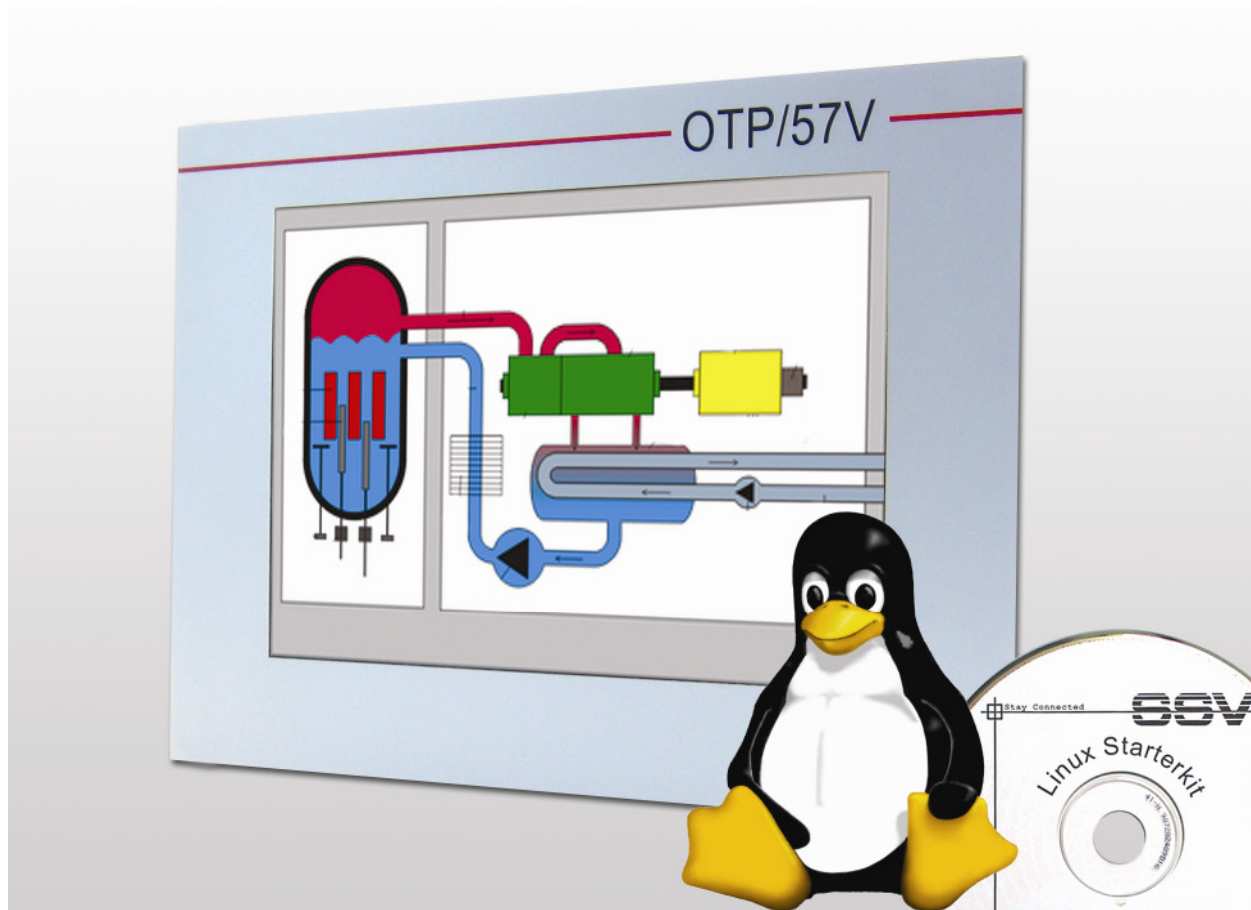


# ***OTP/57V***

## *5.7" Operator Touch Panel*

### **Starter Kit - First Steps**



#### **SSV Embedded Systems**

Heisterbergallee 72  
D-30453 Hannover  
Phone: +49 (0)511/40 000-0  
Fax: +49 (0)511/40 000-40  
E-mail: [sales@ist1.de](mailto:sales@ist1.de)

Document Revision: 1.2  
Date: 2009-05-19

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# 1 INTRODUCTION

The Starter Kit OTP/57V contains everything you need to get started with your 32-bit x86 operator touch panel application. The Starter Kit includes an eSOM/2586 module with a pre-installed MAX-Linux, the Base Board BB6/eSOM with LCD ET057007DHU, power supply, null modem cable, serial interface cable, LAN interface cable, a CD-ROM with software and documentation and a printed user manual for the first steps with the Starter Kit.

Alternatively it is possible to install a ROM DOS operating system for the eSOM/2586 instead of the MAX-Linux. Please contact us for further information.

For using the OTP/57V you need a development system. The minimal configuration for this system is a Windows-based PC with the HyperTerminal terminal emulation program and a free COM port (COM1, COM2 or USB-based COMx) for the RS232 serial link between the eSOM/2586 and HyperTerminal.

For using the Ethernet link, your PC needs an Ethernet adapter with 10 Mbps or 10/100 Mbps LAN interface. This environment allows eSOM/2586 shell script, Java and Perl programming independent from the operating system of the development PC. For using a GNU C/C++ tool chain, it is necessary to run Linux or SSV coLinux on the development system.

## 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
<b>bold</b>	Important terms
<i>italic</i>	User inputs and other specials
monospace	Pathnames, internet addresses and program code

**Table 1: Conventions used in this Document**

### 1.3 Features and Technical Data

- eSOM/2586 with Vortex86DX 32-bit x86 SoC MCU @800 MHz, 128 MByte DDR2 SDRAM and 1 GByte NAND Flash Memory
- Embedded MAX-Linux pre-installed in Flash memory
- Base Board BB6/eSOM with LCD ET057007DHU, 3x UART (2x RS232, 1x RS485), 1x 10/100 Mbps Ethernet LAN, 1x 480 Mbps USB 2.0 host, 1x CAN, 1x SPI, 1x 8-bit PIO
- Front panel for 3U 19" rack mounting
- 110 VAC or 230 VAC to 12/24 VDC international power supply
- CD-ROM with user manual, Linux source code and Eclipse IDE for Java development
- Linux remote login with Telnet or serial link (serial console)
- Telnet server setup sample
- FTP server setup sample
- Pre-installed TFTP client
- Original Sun Java Runtime Environment (JRE) with Swing graphic library
- Many source code samples

The pre-installed MAX-Linux (Maximum Linux) is based on the Debian Etch (4.0) distribution. This Linux comes with all features known from Debian desktop Linux versions.

### 1.4 Block Diagram

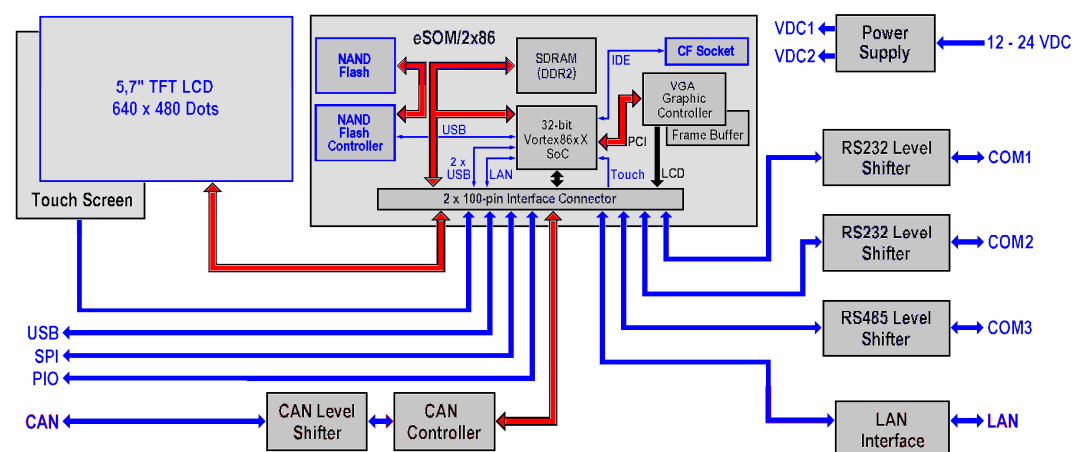
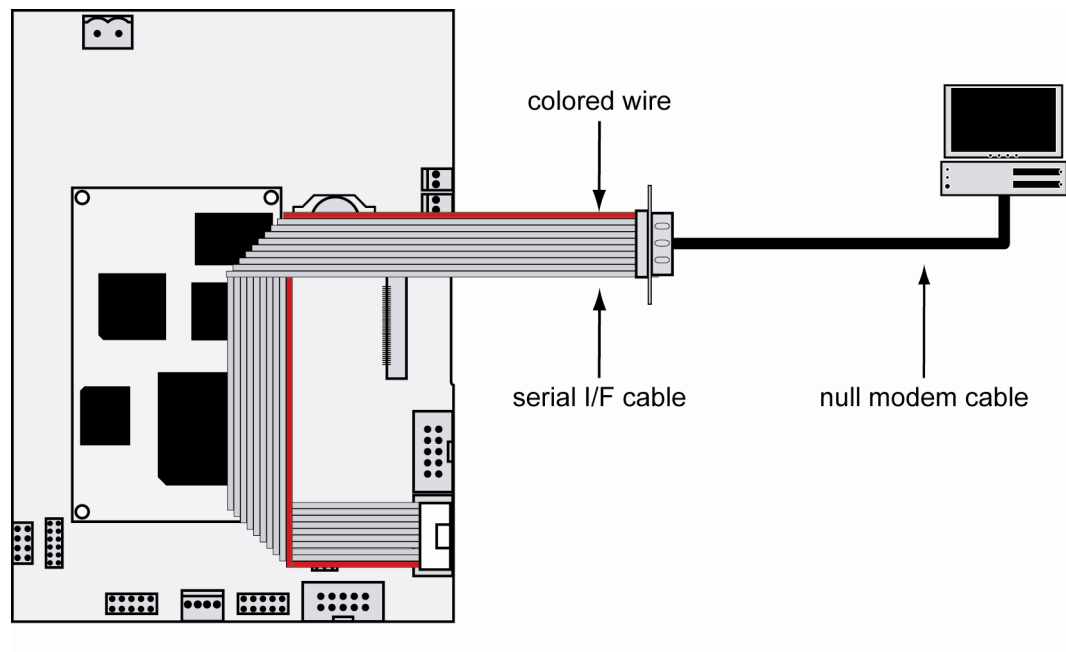


Fig. 1: Block diagram of OTP/57V

## 2 GETTING STARTED

### 2.1 Serial Link between BB6/eSOM and PC

Setup the serial link between the BB6/eSOM and your PC. Use the serial interface cable and the null modem cable for this connection.



**Fig. 2: Serial link between BB6/eSOM and PC**

First connect one end of the serial interface cable with COM1 port of the BB6/eSOM. 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 BB6/eSOM and PC

Setup the Ethernet LAN link between the LAN connector of the BB6/eSOM and your PC. Use the LAN interface cable and an Ethernet cross-over cable or a switch-based infrastructure with patch cables for the LAN connection.

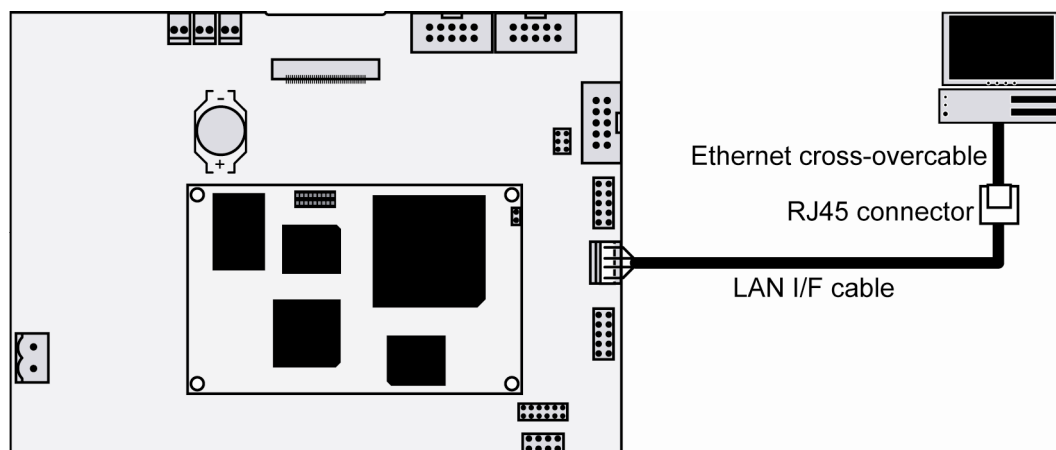


Fig. 3: Ethernet link between BB6/eSOM and PC



**Please note:** The eSOM/2586 comes with the default IP address **192.168.0.126**. Please make sure that your PC can work with the IP address range 192.168.0.x.

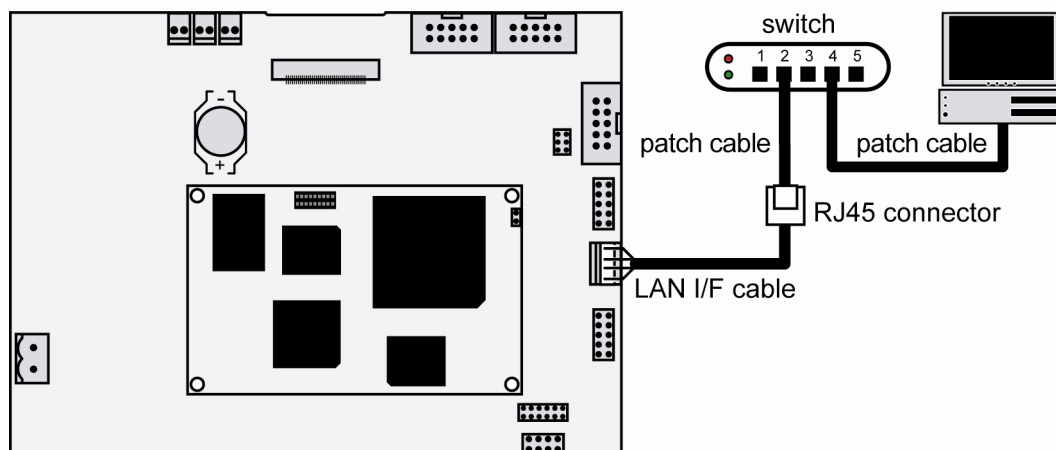


Fig. 4: Switch-based Ethernet link between BB6/eSOM and PC

## 2.3 Connecting Power Supply and Power-up the Starter Kit

Connect the 12..24 VDC power supply (which is included in the scope of delivery of the OTP/57V) with the power connector of the BB6/eSOM.

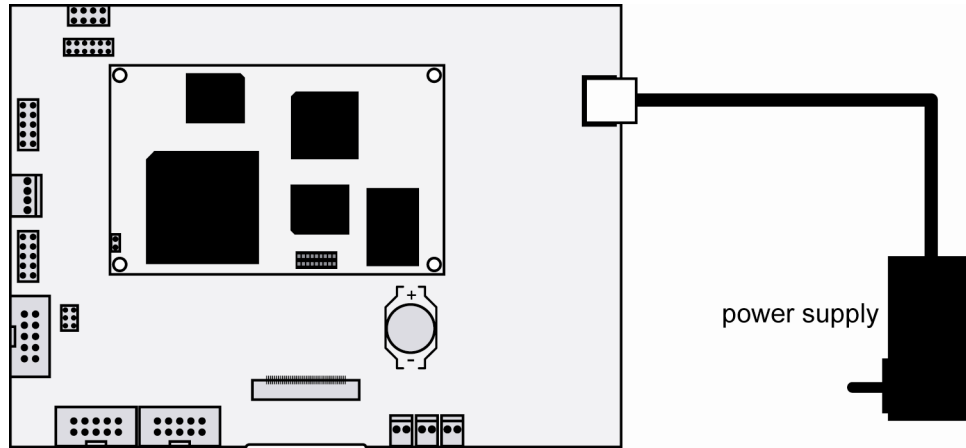


Fig. 5: Power supply for the BB6/eSOM



**CAUTION:** Providing the BB6/eSOM with a voltage higher than the regular 24 VDC  $\pm 10\%$  could resolve in damaged board components!

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

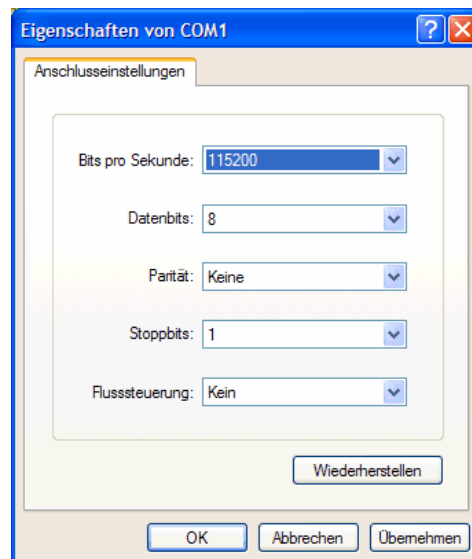
## 2.4 Using Serial Link with Terminal Program

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



**Fig. 6: Direct connection setup with HyperTerminal**

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



**Fig. 7: 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)

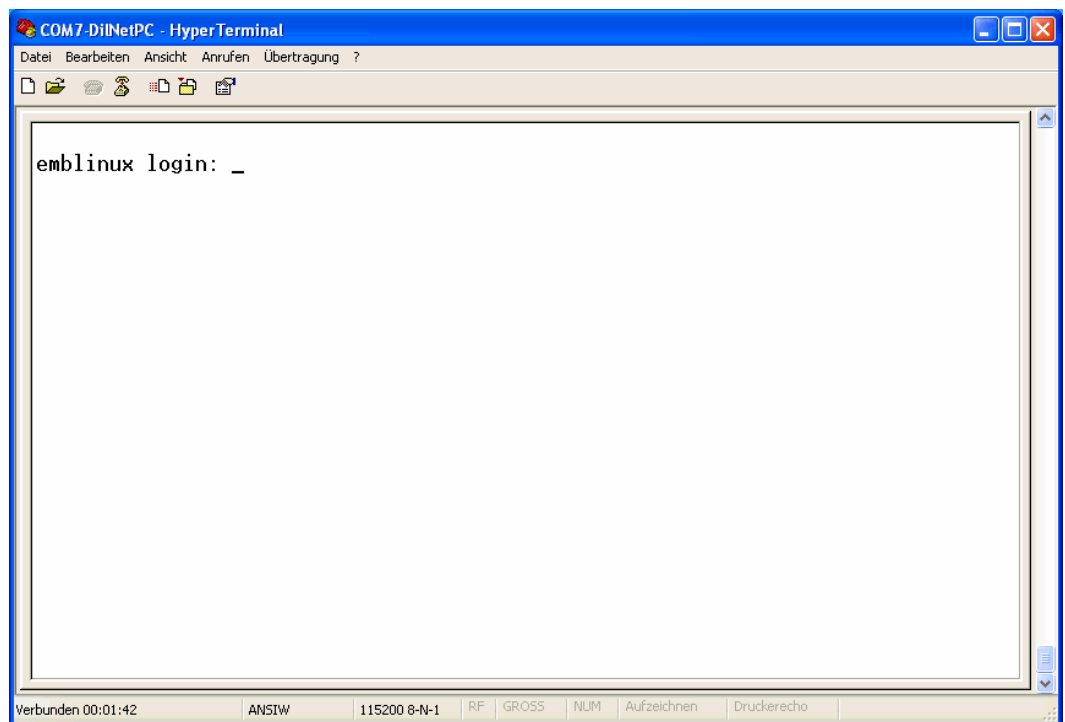
**Table 2: Setup parameters for the serial link**



## 2.5 Power-up eSOM/2586 with RCM disabled

After power-up the eSOM/2586 starts an automatic boot process from the on-board flash memory chip. This process consists of the following steps:

1. Directly after power-up, the eSOM/2586 runs the AMI BIOS. This Basic Input Output System (BIOS) initializes the hardware components and runs the boot loader from the Flash memory. With RCM disabled, there is **no BIOS message output** over the eSOM/2586 serial ports.
2. If the BIOS finish, the eSOM/2586 runs the SYSLINUX boot loader. This software component operates with MS-DOS/Windows FAT file systems. The SYSLINUX boot loader loads the MAX-Linux image form the Flash disk to the RAM and gives the control over the CPU to the Linux operating. With RCM disabled, there is **no SYSLINUX message output** over the eSOM/2586 serial ports.
3. Linux takes control over the eSOM/2586 hardware and runs all necessary processes for coming up to live. With RCM disabled, there is **no Linux message output** over the eSOM/2586 serial ports.



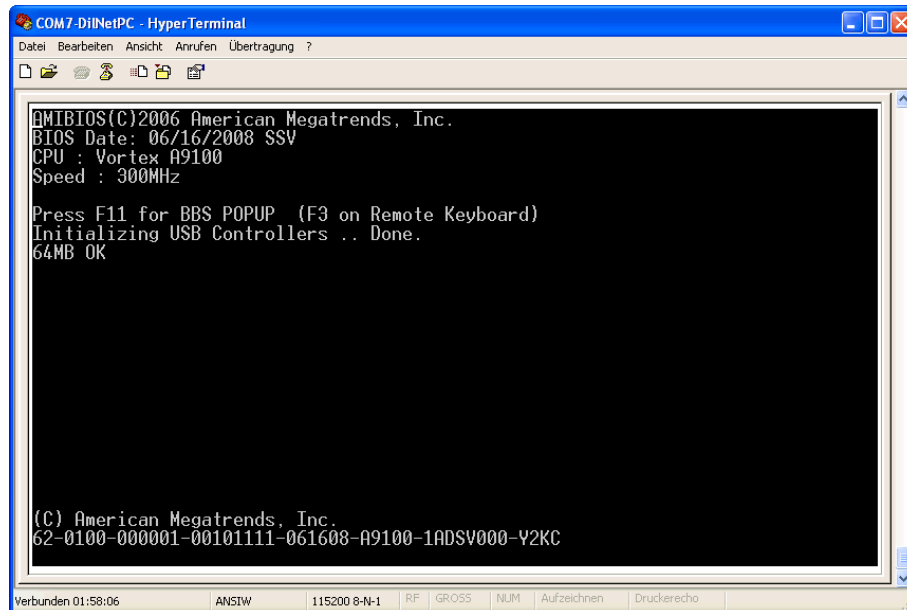
**Fig. 8: Linux booting process with HyperTerminal**

The eSOM/2586 MAX-Linux supports a serial console. It allows a Linux-based system in a headless configuration without a monitor and keyboard. After the boot process finish, the eSOM/2586 MAX-Linux shows a login prompt. Please use the login name **root** and the password **root**.

## 2.6 Power-up eSOM/2586 with RCM enabled

The eSOM/2586 boot sequence with RCM enabled is similar to the boot procedure with RCM disabled. Only some details are different:

1. Directly after power-up, the eSOM/2586 runs the AMI BIOS and initializes the hardware components. With RCM enabled, the BIOS show some messages over the eSOM/2586 COM1 serial port.



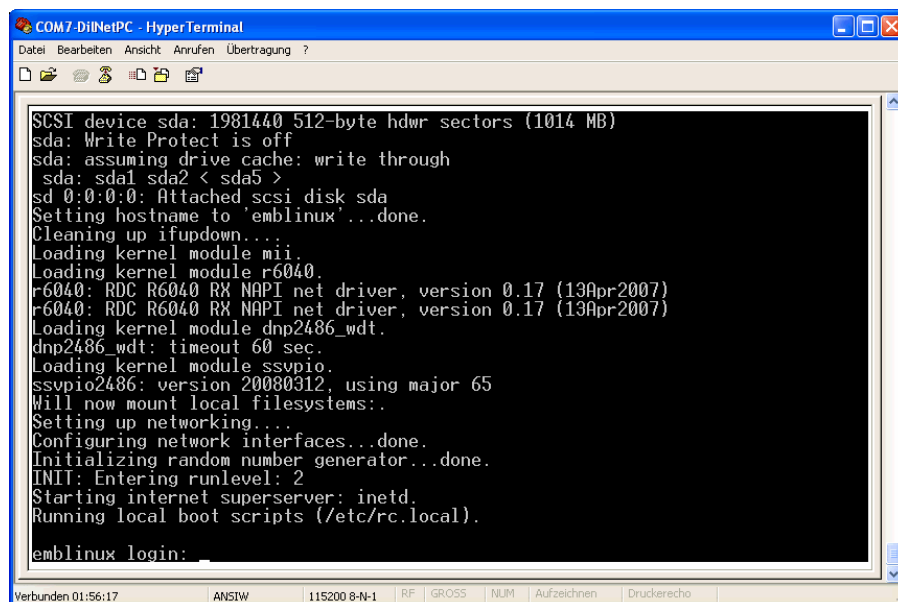
The screenshot shows a HyperTerminal window titled "COM7-DiNetPC - HyperTerminal". The terminal displays the following text:

```
AMIBIOS(C)2006 American Megatrends, Inc.  
BIOS Date: 06/16/2008 SSV  
CPU : Vortex A9100  
Speed : 300MHz  
  
Press F11 for BBS POPUP (F3 on Remote Keyboard)  
Initializing USB Controllers .. Done.  
64MB OK  
  
(C) American Megatrends, Inc.  
62-0100-000001-00101111-061608-A9100-1ADS000-V2KC
```

The status bar at the bottom indicates "Verbunden 01:58:06" and lists various hardware details like "ANSIW", "115200 8-N-1", "RF", "GROSS", "NUM", "Aufzeichnen", and "Druckerecho".

**Fig. 9: The AMI BIOS message direct after power-up**

2. If the BIOS finish, the eSOM/2586 runs the SYSLINUX boot loader. SYSLINUX loads the MAX-Linux image form the Flash disk to the RAM and gives the control over the CPU to the Linux operating. With RCM enabled, SYSLINUX show some messages over the eSOM/2586 COM1 serial port.



The screenshot shows a HyperTerminal window titled "COM7-DiNetPC - HyperTerminal". The terminal displays the following text:

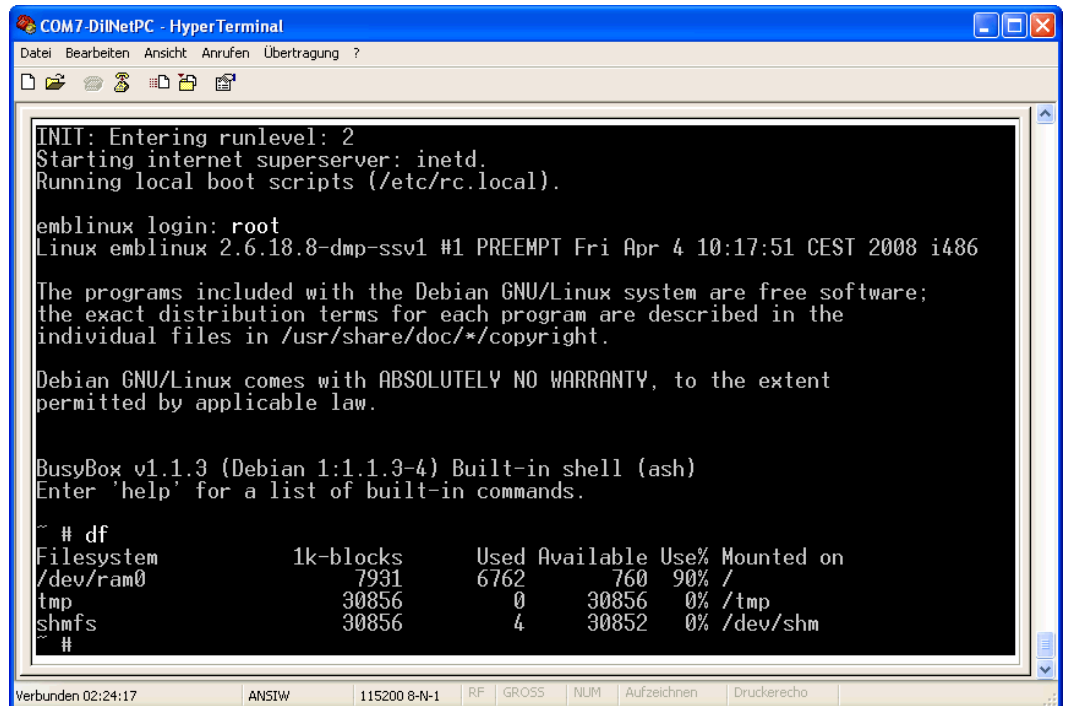
```
SCSI device sda: 1981440 512-byte hdwr sectors (1014 MB)  
sda: Write Protect is off  
sda: assuming drive cache: write through  
sda: sda1 sda2 < sda5 >  
sd 0:0:0:0: Attached scsi disk sda  
Setting hostname to 'emlinux'...done.  
Cleaning up ifupdown...  
Loading kernel module mii.  
Loading kernel module r6040.  
r6040: RDC R6040 RX NAPI net driver, version 0.17 (13Apr2007)  
r6040: RDC R6040 RX NAPI net driver, version 0.17 (13Apr2007)  
Loading kernel module dnp2486_wdt.  
dnp2486_wdt: timeout 60 sec.  
Loading kernel module ssvpio.  
ssvpio2486: version 20080312, using major 65  
Will now mount local filesystems..  
Setting up networking...  
Configuring network interfaces...done.  
Initializing random number generator...done.  
INIT: Entering runlevel: 2  
Starting internet superserver: inetd.  
Running local boot scripts (/etc/rc.local).  
emlinux login: _
```

The status bar at the bottom indicates "Verbunden 01:56:17" and lists various hardware details like "ANSIW", "115200 8-N-1", "RF", "GROSS", "NUM", "Aufzeichnen", and "Druckerecho".

**Fig. 10: After the Linux booting process is a login prompt available**

- Linux takes control over the eSOM/2586 hardware and runs all necessary processes for coming up to live. With RCM enabled, the MAX-Linux shows many detailed boot messages over the eSOM/2586 COM1 serial port.

The eSOM/2586 MAX-Linux supports a serial console. It allows a Linux-based system in a headless configuration without a monitor and keyboard. After the boot process finish, the eSOM/2586 MAX-Linux shows a login prompt. Please use the login name **root** and the password **root**.



```
COM7-DiNetPC - HyperTerminal
Datei Bearbeiten Ansicht Anrufen Übertragung ?

INIT: Entering runlevel: 2
Starting internet superserver: inetd.
Running local boot scripts (/etc/rc.local).

emlinux login: root
Linux emlinux 2.6.18.8-dmp-ssv1 #1 PREEMPT Fri Apr 4 10:17:51 CEST 2008 i486

The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.

BusyBox v1.1.3 (Debian 1:1.1.3-4) Built-in shell (ash)
Enter 'help' for a list of built-in commands.

~ # df
Filesystem            1k-blocks      Used Available Use% Mounted on
/dev/ram0              7931         6762       760   90% /
tmp                   30856           0    30856    0% /tmp
shmfs                 30856           4    30852    0% /dev/shm
~ #
```

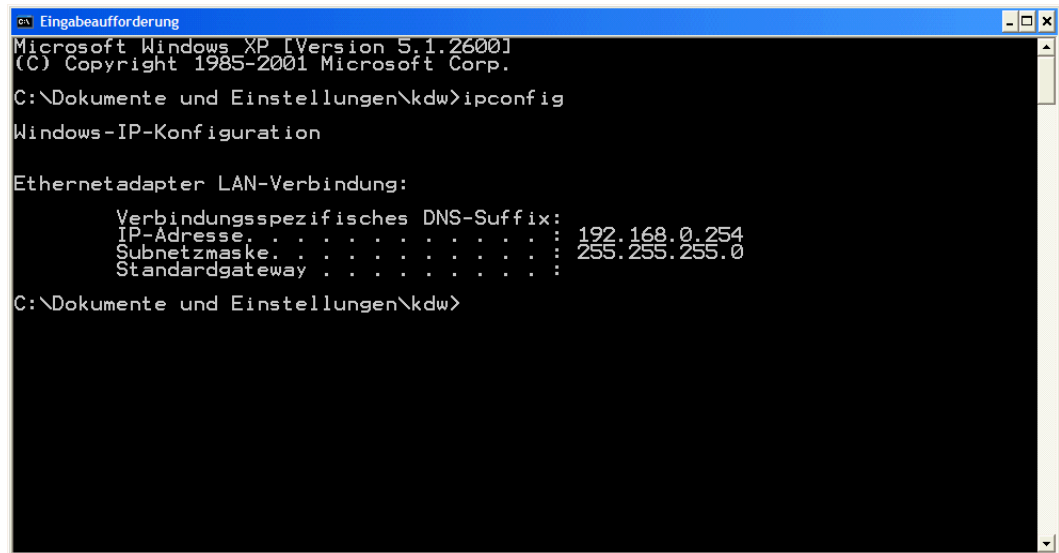
**Fig. 11:** After a login the serial console offers a Linux command line interface

Direct after a successful login the eSOM/2586 MAX-Linux offers a simple Linux command line interface. Please enter *help* to find which build-in commands are available.

## 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 DIL/NetPC.

Please use 192.168.0.1 or 192.168.0.254 for your PC and 192.168.0.126 for the eSOM/2586.



```

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:
    IP-Adresse. . . . . : 192.168.0.254
    Subnetzmaske. . . . . : 255.255.255.0
    Standardgateway . . . . . :

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

**Fig. 12: Windows-PC IP address check with ipconfig**

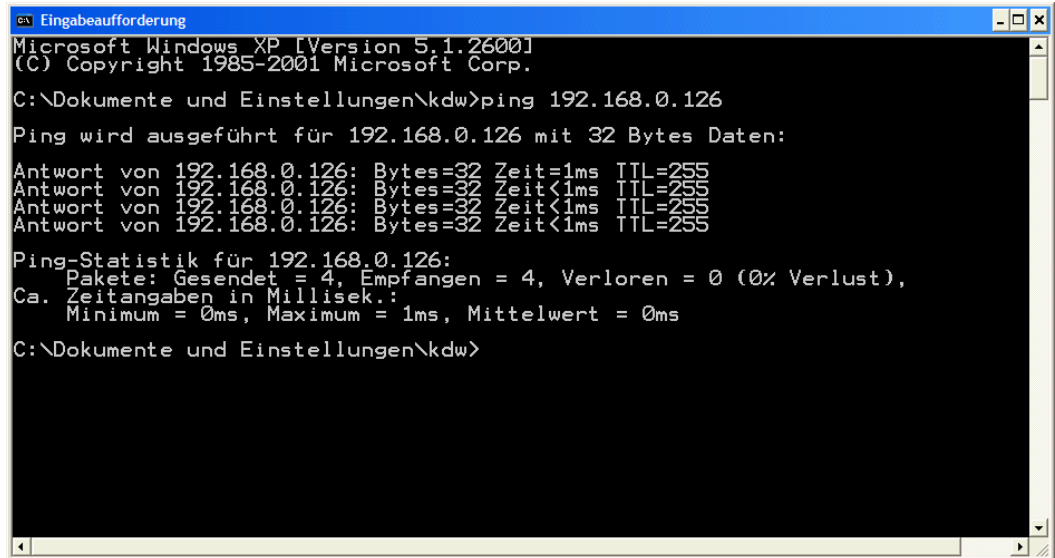
Talk to your network administrator if you have problems with the IP address understanding.



**Please note:** The ex factory IP address 192.168.0.126 of the eSOM/2586 is fixed within the MAX-Linux image. It can only be changed temporary at the RAM disk. After rebooting the system, the ex factory IP address 192.168.0.126 will be used automatically again.

## 2.8 Checking Ethernet-based TCP/IP Communication

Check the Ethernet-based TCP/IP communication between the eSOM/2586 and the PC with a simple *ping* command.



```
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. 13: 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 eSOM/2586. You can use a Telnet session for remote entering Linux commands.

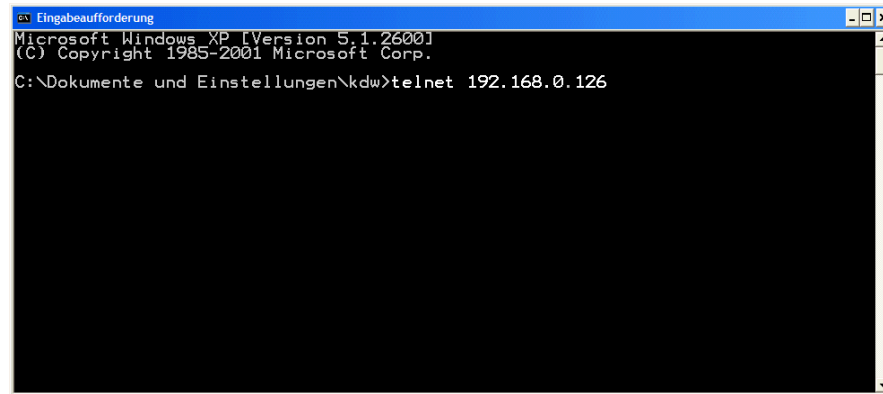


Fig. 14: Run the Windows Telnet client program

Wait until the eSOM/2586 MAX-Linux requests a user name. Please enter the user name *root*. and the password *root*.

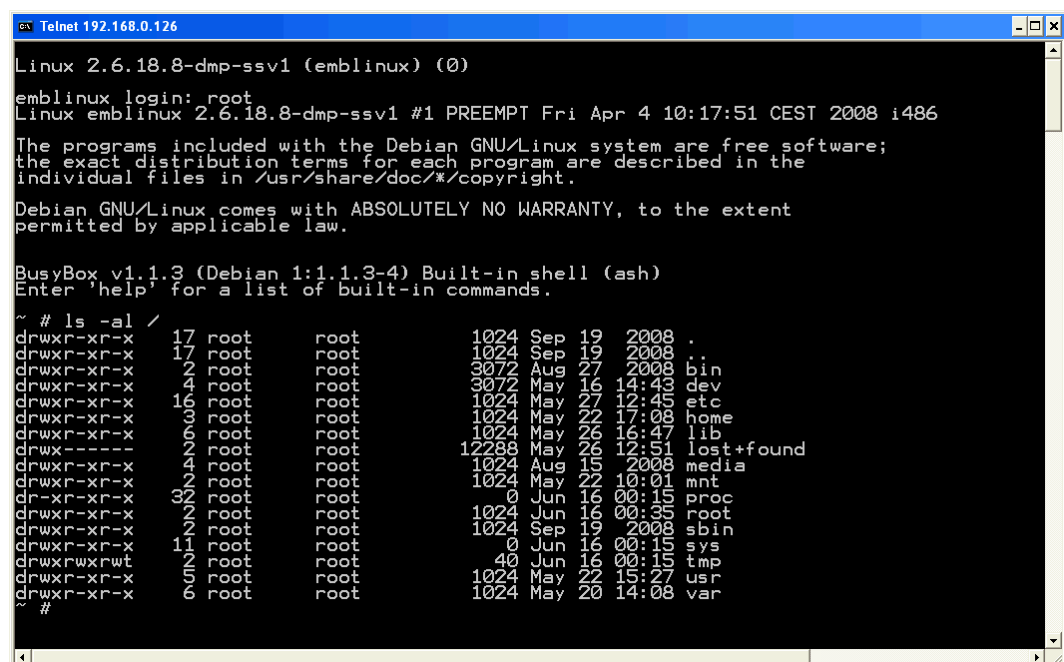
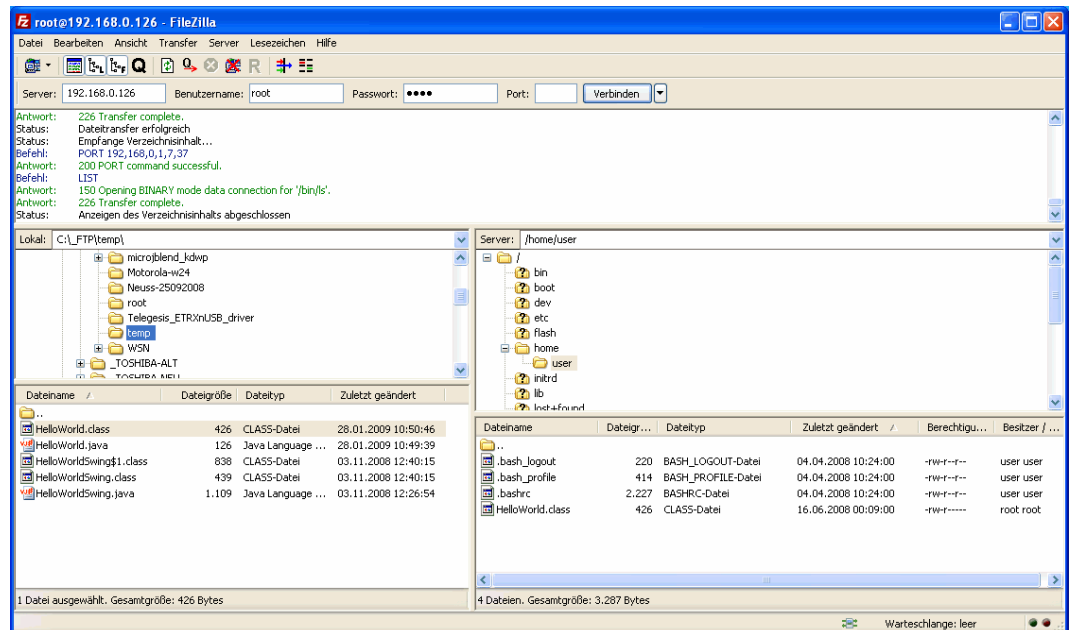


Fig. 15: Using Linux commands within a Telnet client window

## 2.10 Checking FTP Server

The eSOM/2586 Linux comes with a pre-installed FTP server. This server allows the file transfer between a PC and the eSOM/2586.

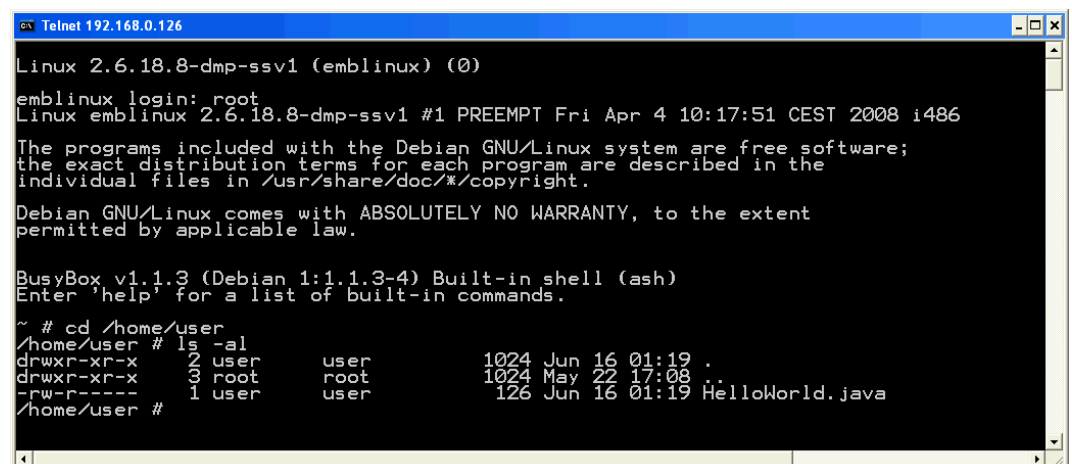
Run an FTP client program on your PC. Set the session parameters for your FTP client to IP address **192.168.0.126**, user name **root** and password **root**. After a successful FTP login the eSOM/2586 FTP server allows R/W access to all MAX-Linux directories.



**Fig. 16: The FTP server allows R/W access to all MAX-Linux directories**

Connect your FTP client with the eSOM/2586 FTP server and transfer some files from the PC to the eSOM/2586 directory `/home/user`.

Check the new files with a Telnet session. Change to the eSOM/2586 directory `/home/user` within your Telnet session.

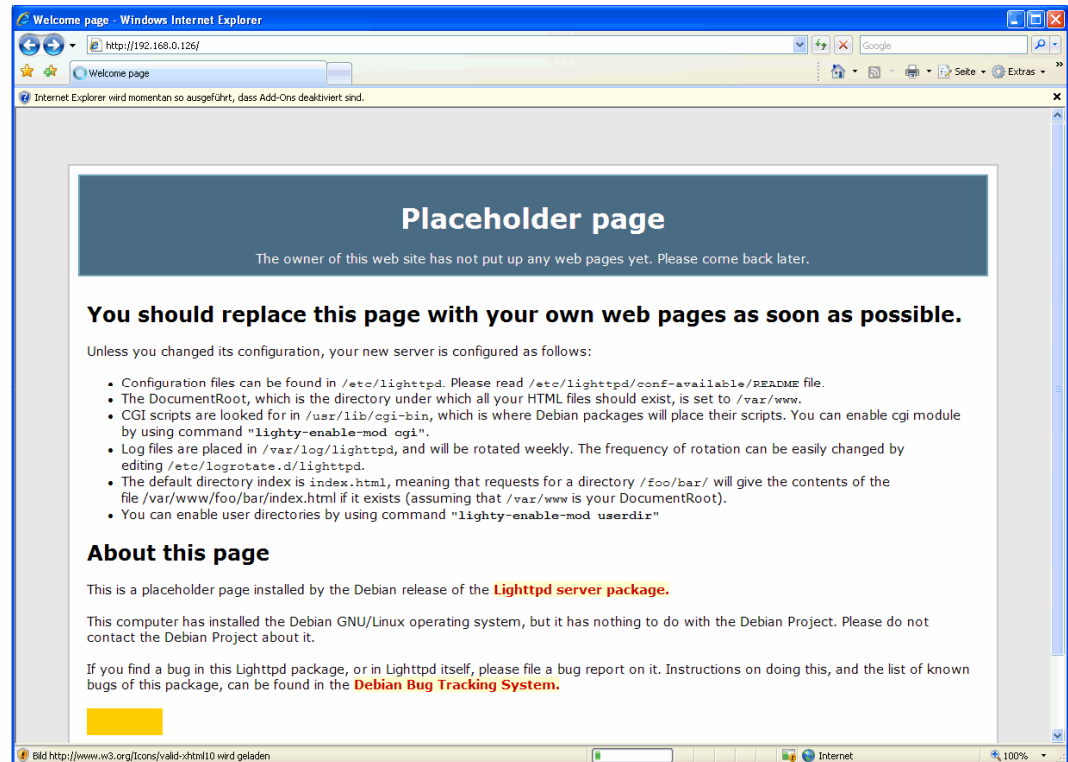


**Fig. 17: The new files within /home/user**

## 2.11 Checking HTTP Server

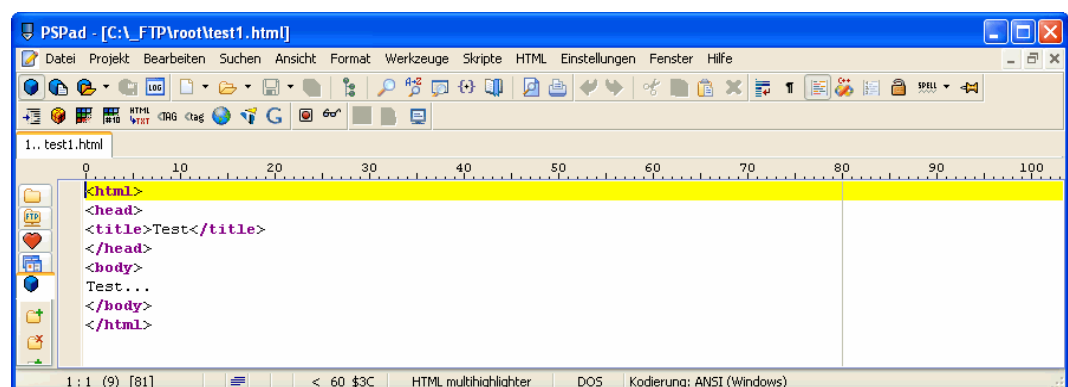
The eSOM/2586 MAX-Linux comes with a pre-installed `lighttpd` web server. This very powerful embedded web server allows you to build feature-rich web-based applications. To access the eSOM/2586 web server, please run your PC web browser and use the URL:

`http://192.168.0.126`



**Fig. 18:** The web server delivers a placeholder web page a to PC web browser

Create your first own HTML page on your PC. For this sample save the HTML page content within a file with the name `test1.html`.

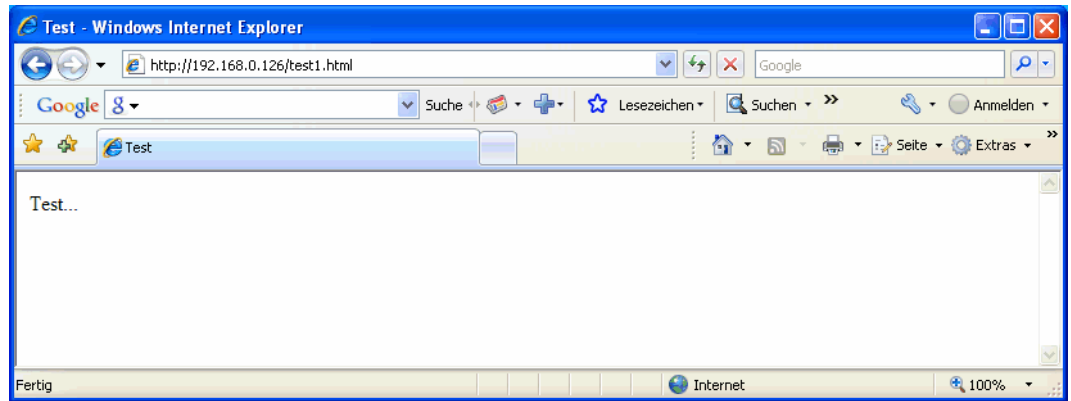


**Fig. 19:** Use an editor and create the HTML sample file `test1.html`



Transfer the file `test1.html` with the help of FTP or TFTP to the eSOM/2586 directory `/var/www`. Then change the attributes with

```
chmod +r /var/www/test1.html
```



**Fig. 20:** The URL `http://192.168.0.126/test1.html` delivers the new HTML file

To access the new the HTML sample file `test1.html` run your web browser and enter the URL:

```
http://192.168.0.126/test1.html
```

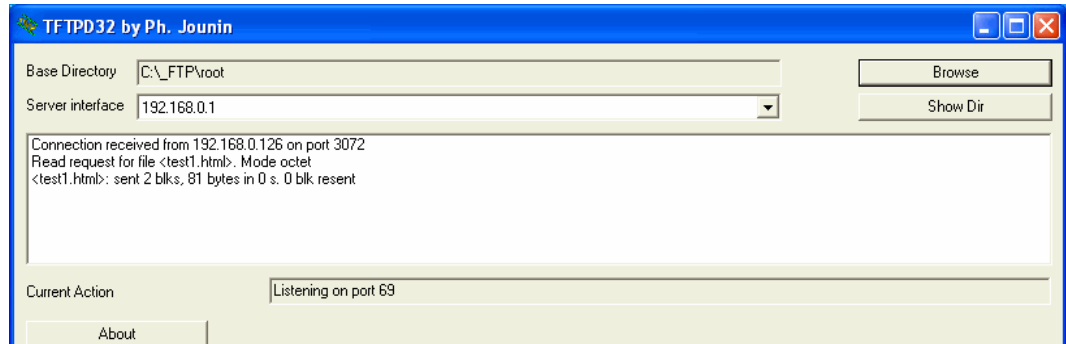
Directory	Usage
<code>/var/www</code>	HTML files
<code>/etc/lighttpd</code>	Web server configuration
<code>/var/log/lighttpd</code>	Web Server log files
<code>/usr/lib/cgi-bin</code>	CGI scripts files

**Table 3:** Important directories of the lighttpd web server

## 2.12 Checking TFTP Client

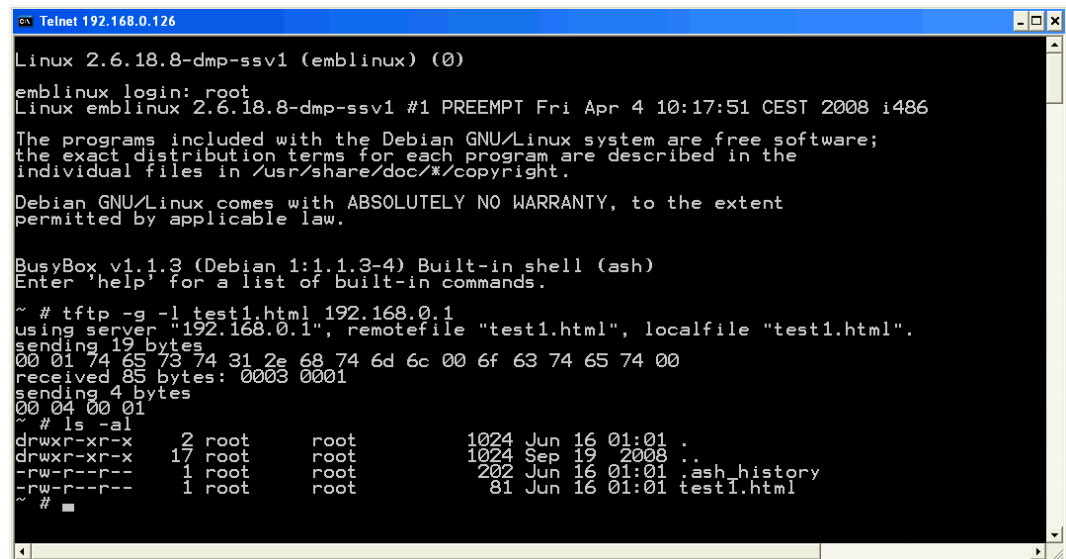
The eSOM/2586 Linux offers also a pre-installed TFTP client. This program allows the TFTP-based file transfer between a PC and the eSOM/2586.

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. 21: Running the Win32 TFTP server**

Figure 19 shows the free Win32 TFTP server in action. This server allows file transfers to and from any eSOM/2586 directory.



**Fig. 22: Download with TFTP get command**

Enter your get and put commands within a Telnet session. The figure above shows a sample for a TFTP get command (getting a file from the PC to the eSOM/2586). Here we enter:

```
tftp -g -l test1.html 192.168.0.1
```

test1.html is the filename which is requested from the TFTP server. 192.168.0.1 is the TFTP server IP address.

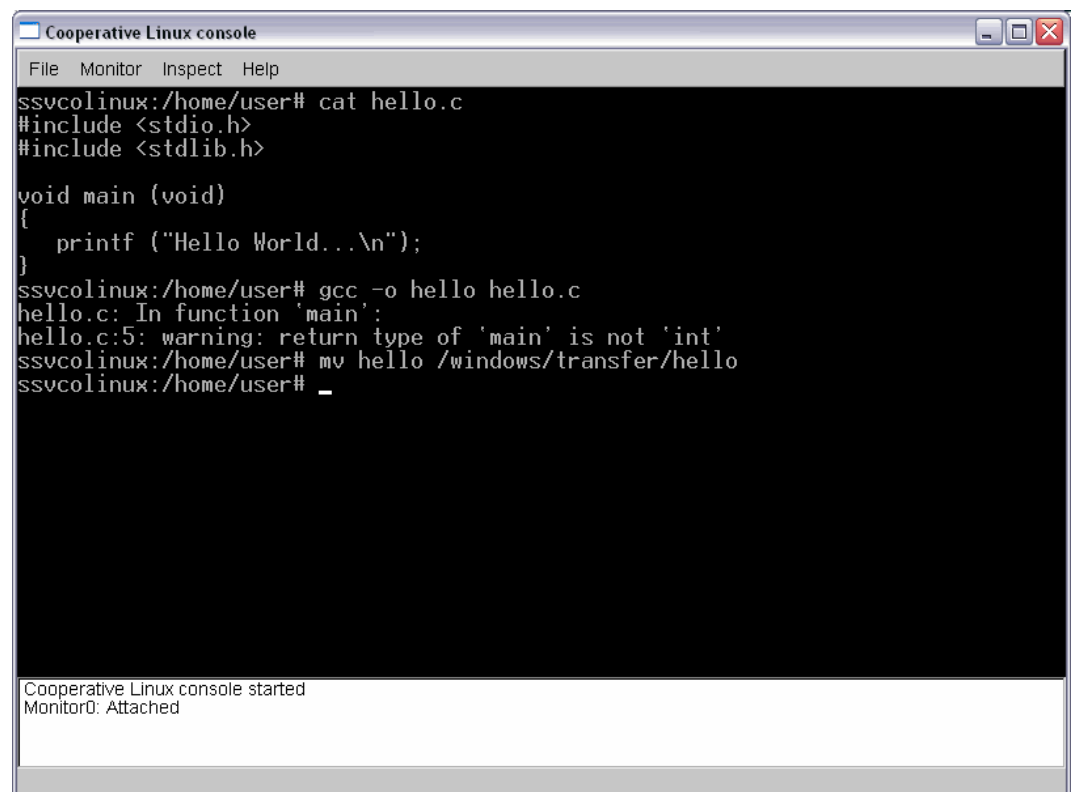
## 2.13 “Hello World” with C/C++ and SSV coLinux

The SSV coLinux tool chain allows you to write C/C++ programs for the eSOM/2586 within your Windows XP environment. It is not necessary to setup a Linux-based PC for the C/C++ programming.

Before following the next steps make sure, that the SSV coLinux tool chain is installed on your Windows XP-based PC. It is also required to have a transfer directory for moving files between the Windows XP and coLinux. The directory can be C:\colinux\transfer. From coLinux you can access the directory with the path name /windows/transfer.

Run coLinux within your Windows XP environment. Use the user name *root* and the password *root* for your coLinux login. Then move to the coLinux directory /home/user within the coLinux user console. Within the user console please execute the following command line sequence:

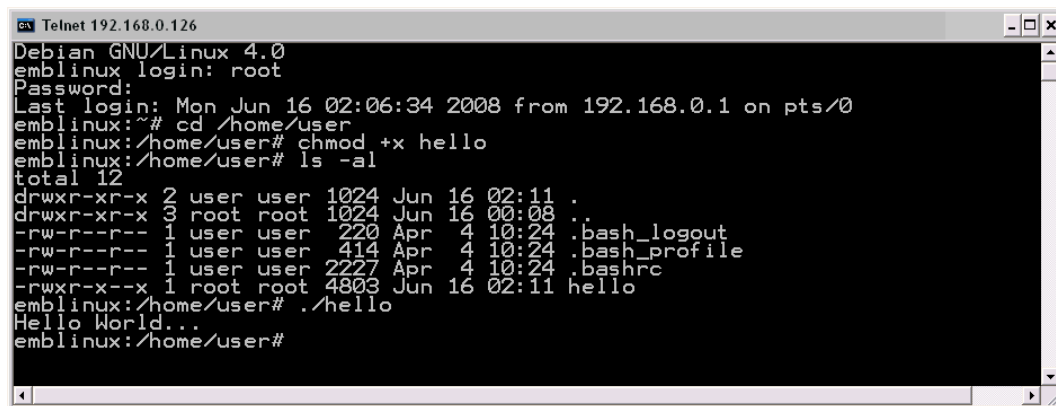
```
cat > hello.c
#include <stdio.h>
void main (void)
{
    printf ("Hello World.\n");
}
CTRL-D (Stops the cat command)
gcc -o hello hello.c
mv hello /windows/transfer/hello
```



**Fig. 23: Creating hello world within the Linux console**

The command line sequence creates the executable *hello* for the x86/IA-32-based eSOM/2586 with a Linux 2.6 kernel. Then transfer the executable with the help of FTP or TFTP to the eSOM/2586 and run the executable. Don't forget the

```
chmod +x hello
```



```

Telnet 192.168.0.126
Debian GNU/Linux 4.0
emblinux login: root
Password:
Last login: Mon Jun 16 02:06:34 2008 from 192.168.0.1 on pts/0
emblinux:~# cd /home/user
emblinux:/home/user# chmod +x hello
emblinux:/home/user# ls -al
total 12
drwxr-xr-x 2 user user 1024 Jun 16 02:11 .
drwxr-xr-x 3 root root 1024 Jun 16 00:08 ..
-rw-r--r-- 1 user user 220 Apr 4 10:24 .bash_logout
-rw-r--r-- 1 user user 414 Apr 4 10:24 .bash_profile
-rw-r--r-- 1 user user 2227 Apr 4 10:24 .bashrc
-rwxr-x--x 1 root root 4803 Jun 16 02:11 hello
emblinux:/home/user# ./hello
Hello World...
emblinux:/home/user#

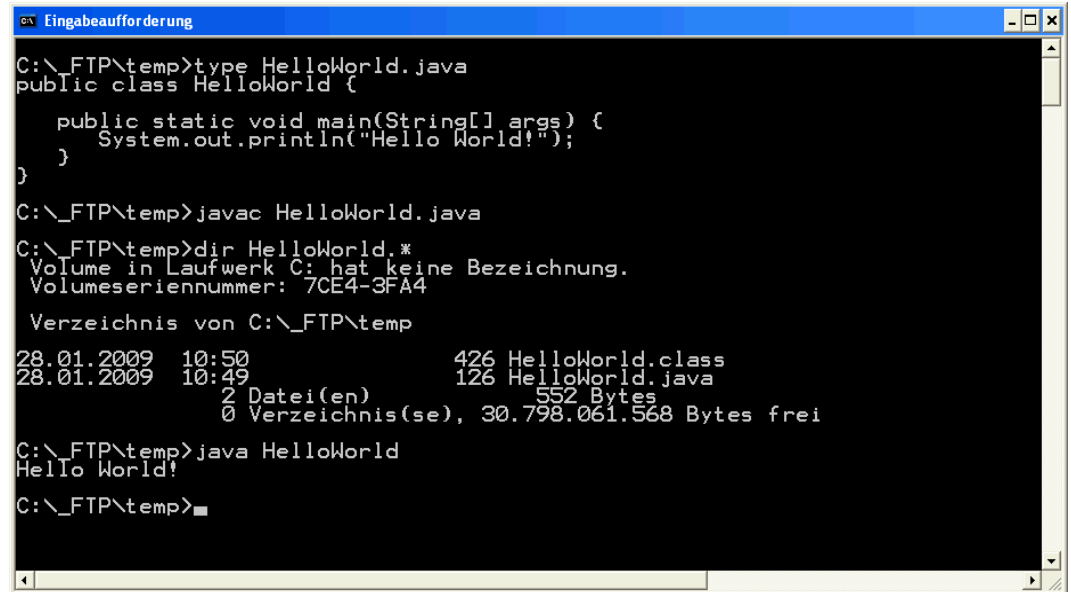
```

**Fig. 24:** Executing hello world within the Linux console

**Please note:** C/C++ programming for the eSOM/2586 doesn't need a cross GCC. You can use the native GCC of a Linux environment with kernel version 2.6.

## 2.14 “Hello World” with Java

The eSOM/2586 MAX-Linux comes with a preinstalled Java 6 runtime environment (Sun J2SE). This allows you to run platform-independent Java class files on the eSOM/2586. Before following the next steps make sure, that the original Sun Java Development Kit (JDK) for Java 6 is installed on your development PC.



```
C:\_FTP\temp>type HelloWorld.java
public class HelloWorld {
    public static void main(String[] args) {
        System.out.println("Hello World!");
    }
}

C:\_FTP\temp>javac HelloWorld.java

C:\_FTP\temp>dir HelloWorld.*
Volume in Laufwerk C: hat keine Bezeichnung.
Volumeseriennummer: 7CE4-3FA4

Verzeichnis von C:\_FTP\temp

28.01.2009  10:50                426 HelloWorld.class
28.01.2009  10:49                126 HelloWorld.java
               2 Datei(en)                552 Bytes
               0 Verzeichnis(se), 30.798.061.568 Bytes frei

C:\_FTP\temp>java HelloWorld
Hello World!

C:\_FTP\temp>
```

**Fig. 25: Edit and compile the Java Hello World sample on your PC**

Run a simple text editor or a special programmer editor on your development PC and enter the following text lines:

```
public class HelloWorld {
    public static void main(String[] args) {
        System.out.println("Hello World!");
    }
}
```

Store the sample lines within a file with the name `HelloWorld.java`. Then run your Java 6 compiler and generate a class file with the name `HelloWorld.class`. The command line for this task is:

```
javac HelloWorld.java
```

Transfer the class file `HelloWorld.class` with the help of FTP or TFTP to the eSOM/2586. Then execute the class file with the following command line:

```
java HelloWorld
```

```

Telnet 192.168.0.126
Debian GNU/Linux 4.0
emblinux login: root
Password:
Last login: Mon Jun 16 08:51:04 2008 from 192.168.0.1 on pts/0
emblinux:~# cd /home/user
emblinux:/home/user# ls -al
total 19
drwxr-xr-x  2 user user  1024 Jun 16 02:19 .
drwxr-xr-x  3 root root  1024 Jun 16 00:08 ..
-rw-r--r--  1 user user    220 Apr  4 10:24 .bash_logout
-rw-r--r--  1 user user    414 Apr  4 10:24 .bash_profile
-rw-r--r--  1 user user   2227 Apr  4 10:24 .bashrc
-rw-r--r--  1 root root    426 Jun 16 02:19 HelloWorld.class
-rwxr-xr-x  1 root root 11066 Jun 16 2008 hello
emblinux:/home/user# java HelloWorld
Hello World!
emblinux:/home/user# _

```

**Fig. 26: Run the Java Hello World sample on the eSOM/2586**

## 2.15 Changing the MAX-Linux 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 with the eSOM/2586 *IPbyNET* feature.

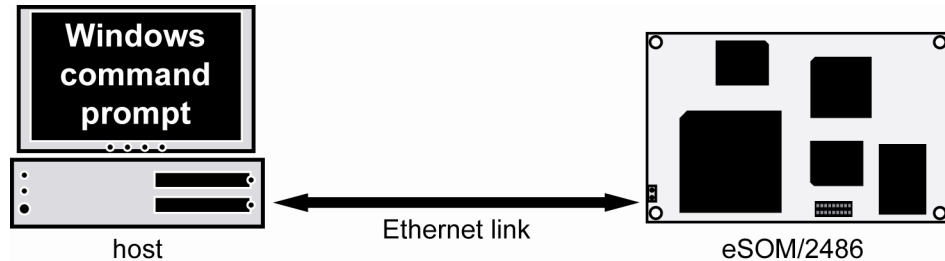
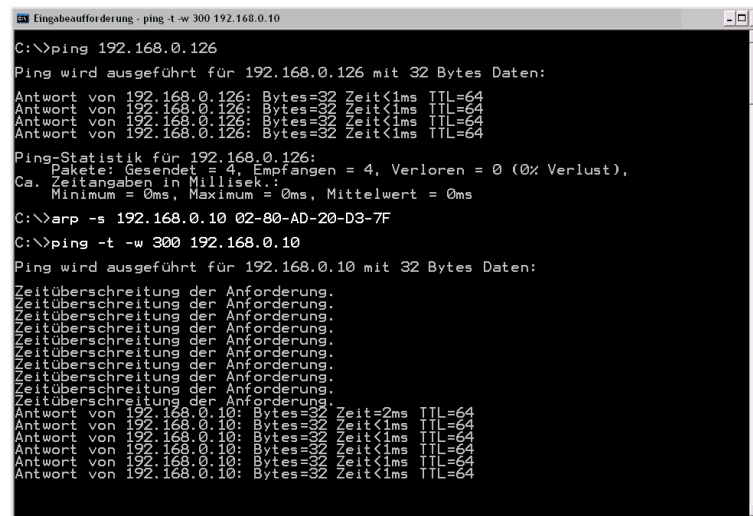


Fig. 27: Environment for IP address change with *IPbyNet*

*IPbyNET* is an eSOM/2586 MAX-Linux component, which checks direct after each boot process the presence of ICMP echo request packets with the MAC address of the eSOM/2586 Ethernet LAN interface. If an ICMP packet is available, *IPbyNET* extracts the destination IP address from the ICMP echo request packet and sets the eSOM/2586 Ethernet LAN interface with this IP address.



```

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
Antwort von 192.168.0.126: Bytes=32 Zeit<1ms TTL=64
Antwort von 192.168.0.126: Bytes=32 Zeit<1ms TTL=64
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.
Zeitüberschreitung der Anforderung.
Zeitüberschreitung der Anforderung.
Zeitüberschreitung der Anforderung.
Zeitüberschreitung der Anforderung.
Zeitüberschreitung der Anforderung.
Zeitüberschreitung der Anforderung.
Zeitüberschreitung der Anforderung.
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
Antwort von 192.168.0.10: Bytes=32 Zeit<1ms TTL=64
Antwort von 192.168.0.10: Bytes=32 Zeit<1ms TTL=64
Antwort von 192.168.0.10: Bytes=32 Zeit<1ms TTL=64
Antwort von 192.168.0.10: Bytes=32 Zeit<1ms TTL=64

```

Fig. 28: Changing the IP address with *IPbyNet*

Please see the label with the MAC address of the eSOM/2586 on the top of your device to find the MAC address for your eSOM/2586. 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 eSOM/2586.

Then reboot the eSOM/2586. After a few seconds the eSOM/2586 responds to the *ping* with the new IP address.



**Please note:** Changing the IP address of your eSOM/2586 with *IPbyNET* resets also the web-based configuration interface settings to factory defaults!



## 3 MAX-LINUX

---

This part describes the main features of the user installable MAX-Linux system for the eSOM/2586. MAX-Linux features a typical standard Linux system, based on the Debian Etch (4.0) distribution. MAX-Linux makes use of a complete user defined boot process that uses special kernel parameters to boot into rootfs without the need of initial RAM disk.

The MAX-Linux root file system uses an extended ext3 partition of the eSOM/2586 NAND Flash memory and offers complete user access (non-volatile R/W access). All features of the kernel and hardware specific modules for the Vortex86DX SOC are integrated, as well as the complete set of applications and tools known from base system of the famous Debian desktop version.

MAX-Linux offers console-based access to the platform, either through serial line or the Ethernet infrastructure and supports Telnet or the more secure ssh protocol.

### 3.1 Main Features

---

- Syslinux 3.63 based bootloader system for USB-NAND flash
- Linux-Kernel Version 2.6.18.8-dmp-ssv1 (standard debian kernel modules)
- Debian Etch (4.0) based ext3 rootfs filesystem (non-volatile)
- Java(TM) SE Runtime Environment (build 1.6.0\_03-b05)
- X-Server base system with full GPU support

### 3.2 General Tools

---

- GNU bash (Version 3.1.17)
- Perl interpreter (Version 5.8.8)
- apt-get and aptitude (Software package management)
- packaging tools (tar, gzip, bzip2, zip)
- midnight commander (file manager)
- Rich set of command line applications and tools known from the Debian desktop version

### 3.3 File System Tools

---

- vfat, fat, msdos, iso (iso8859), nfs and many more modules for filesystem mount support
- fdisk harddisk partitioning tool
- mkfs.ext2, mkfs.ext3, mkfs.vfat, mkfs.msos formatting tool
- tune2fs tool
- loop device support

### 3.4 Network Features

---

- dhcp client
- ipv4 and ipv6 kernel modules
- telnet-daemon for network remote login
- ssh-daemon for secure network remote login
- ftp-daemon for network file transfer
- full featured tftp client
- webserver lighttpd
- socat

### 3.5 Kernel Module Support

---

- lsmod
- depmod
- modprobe
- rmmod

### 3.6 Other Features

---

- minicom
- login and getty standard utilities for remote login
- passwd password utility
- addgroup, adduser, delgroup, deluser (non-volatile user management)
- pivot\_root, chroot capabilities
- halt, reboot, shutdown features
- full kernel module support (standard Debian kernel modules for a variety of devices)

### 3.7 MAX-Linux Boot Messages

```

Linux    version 2.6.18.8-dmp-ssv1    (mha@hareangle-saturn) ↵
SSV20080404 (gcc-Version 4.1.2 20061115 (prerelease) (Debian ↵
4.1.1-21)) #1 PREEMPT Fri Apr 4 10:17:51 CEST 2008
BIOS-provided physical RAM map:
  BIOS-e820: 0000000000000000 - 00000000000009fc00 (usable)
  BIOS-e820: 00000000000009fc00 - 0000000000000a0000 (reserved)
  BIOS-e820: 0000000000000e0000 - 000000000000100000 (reserved)
  BIOS-e820: 000000000000100000 - 000000000000400000 (usable)
  BIOS-e820: 00000000ff000000 - 0000000100000000 (reserved)
64MB LOWMEM available.
DMI not present or invalid.
Allocating PCI resources starting at 10000000 (gap: ↵
04000000:fb000000)
Built 1 zonelists. Total pages: 16384
Kernel command line: root=/dev/sda5 ro console=ttyS0,115200 ↵
pnpbios=off acpi=off rootdelay=6 ssvinit BOOT_IMAGE=bzImage
No local APIC present or hardware disabled
Initializing CPU#0
PID hash table entries: 512 (order: 9, 2048 bytes)
Console: colour dummy device 80x25
Dentry cache hash table entries: 8192 (order: 3, 32768 bytes)
Inode-cache hash table entries: 4096 (order: 2, 16384 bytes)
Memory: 61388k/65536k available (1838k kernel code, 3700k re ↵
served, 713k data, 264k init, 0k highmem)
Checking if this processor honours the WP bit even in ↵
supervisor mode... Ok.
Security Framework v1.0.0 initialized
SELinux: Disabled at boot.
Capability LSM initialized
Mount-cache hash table entries: 512
Compat vDSO mapped to fffffe000.
CPU: 486
Checking 'hlt' instruction... OK.
NET: Registered protocol family 16
EISA bus registered
PCI: Using configuration type 1
Setting up standard PCI resources
ACPI: Interpreter disabled.
Linux Plug and Play Support v0.97 (c) Adam Belay
pnp: PnP ACPI: disabled
PnPBIOS: Disabled
SCSI subsystem initialized
usbcore: registered new driver usbfs
usbcore: registered new driver hub
PCI: Probing PCI hardware
PCI: Using IRQ router default [17f3/6031] at 0000:00:07.0
NET: Registered protocol family 2
IP route cache hash table entries: 512 (order: -1, 2048 bytes)
TCP established hash table entries: 2048 (order: 1, 8192 bytes)
TCP bind hash table entries: 1024 (order: 0, 4096 bytes)
TCP: Hash tables configured (established 2048 bind 1024)
TCP reno registered
audit: initializing netlink socket (disabled)
audit(1213580399.552:1): initialized
VFS: Disk quotas dquot_6.5.1
Dquot-cache hash table entries: 1024 (order 0, 4096 bytes)
Initializing Cryptographic API
io scheduler noop registered
io scheduler anticipatory registered

```

```

io scheduler deadline registered
io scheduler cfq registered (default)
isapnp: Scanning for PnP cards...
isapnp: No Plug & Play device found
Serial: 8250/16550 driver $Revision: 1.90 $ 4 ports, IRQ ↵
sharing enabled
serial8250: ttyS0 at I/O 0x3f8 (irq = 4) is a 16550A
serial8250: ttyS1 at I/O 0x2f8 (irq = 3) is a 16550A
serial8250: ttyS2 at I/O 0x3e8 (irq = 4) is a 16550A
serial8250: ttyS3 at I/O 0x2e8 (irq = 3) is a 16550A
RAMDISK driver initialized: 16 RAM disks of 8192K size 1024 ↵
blocksize
ehci_hcd 0000:00:0a.1: EHCI Host Controller
ehci_hcd 0000:00:0a.1: new USB bus registered, assigned bus ↵
number 1
ehci_hcd 0000:00:0a.1: irq 9, io mem 0x000e2000
ehci_hcd 0000:00:0a.1: USB 2.0 started, EHCI 1.00, driver 10 ↵
Dec 2004
usb usb1: configuration #1 chosen from 1 choice
hub 1-0:1.0: USB hub found
hub 1-0:1.0: 2 ports detected
ehci_hcd 0000:00:0b.1: EHCI Host Controller
ehci_hcd 0000:00:0b.1: new USB bus registered, assigned bus ↵
number 2
ehci_hcd 0000:00:0b.1: irq 10, io mem 0x000e2100
ehci_hcd 0000:00:0b.1: USB 2.0 started, EHCI 1.00, driver 10 ↵
Dec 2004
usb usb2: configuration #1 chosen from 1 choice
hub 2-0:1.0: USB hub found
hub 2-0:1.0: 2 ports detected
ohci_hcd 0000:00:0a.0: OHCI Host Controller
ohci_hcd 0000:00:0a.0: new USB bus registered, assigned bus ↵
number 3
ohci_hcd 0000:00:0a.0: irq 5, io mem 0x000e0000
usb usb3: configuration #1 chosen from 1 choice
hub 3-0:1.0: USB hub found
hub 3-0:1.0: 2 ports detected
ohci_hcd 0000:00:0b.0: OHCI Host Controller
ohci_hcd 0000:00:0b.0: new USB bus registered, assigned bus ↵
number 4
ohci_hcd 0000:00:0b.0: irq 11, io mem 0x000e1000
usb 2-1: new high speed USB device using ehci_hcd and address 2
usb usb4: configuration #1 chosen from 1 choice
hub 4-0:1.0: USB hub found
hub 4-0:1.0: 2 ports detected
usb 2-1: configuration #1 chosen from 1 choice
Initializing USB Mass Storage driver...
scsi0 : SCSI emulation for USB Mass Storage devices
usbcore: registered new driver usb-storage
USB Mass Storage support registered.
PNP: No PS/2 controller found. Probing ports directly.
serio: i8042 AUX port at 0x60,0x64 irq 12
serio: i8042 KBD port at 0x60,0x64 irq 1
mice: PS/2 mouse device common for all mice
EISA: Probing bus 0 at eisa.0
EISA: Detected 0 cards.
TCP bic registered
NET: Registered protocol family 1
NET: Registered protocol family 17
NET: Registered protocol family 8

```

NET: Registered protocol family 20

```
Using IPI Shortcut mode
Waiting 6sec before mounting root device...
Time: pit clocksource has been installed.
  Vendor: SMI          Model: USB DISK          Rev: 1100
  Type:   Direct-Access          ANSI SCSI ↵
revision: 00
SCSI device sda: 1981440 512-byte hdwr sectors (1014 MB)
sda: Write Protect is off
sda: assuming drive cache: write through
SCSI device sda: 1981440 512-byte hdwr sectors (1014 MB)
sda: Write Protect is off
sda: assuming drive cache: write through
  sda: sda1 sda2 < sda5 >
sd 0:0:0:0: Attached scsi disk sda
EXT3-fs: INFO: recovery required on readonly filesystem.
EXT3-fs: write access will be enabled during recovery.
kjournald starting. Commit interval 5 seconds
EXT3-fs: recovery complete.
EXT3-fs: mounted filesystem with ordered data mode.
VFS: Mounted root (ext3 filesystem) readonly.
Freeing unused kernel memory: 264k freed
```

INIT: version 2.86 booting

```
EXT3 FS on sda5, internal journal
Setting the system clock..
Cleaning up ifupdown....
Loading kernel modules...r6040: RDC R6040 RX NAPI net driver, ↵
version 0.17 (13Apr2007)
r6040: RDC R6040 RX NAPI net driver, version 0.17 (13Apr2007)
dnp2586_wdt: timeout 60 sec.
ssvpio2586: version 20080312, using major 65
done.
/etc/ssvconfig/sbin/ipbynet: create child with pid 367
Setting kernel variables...done.
Mounting local filesystems...done.
Activating swapfile swap...done.
Setting up networking....
Configuring network interfaces...done.
Starting web server: lighttpd
NET: Registered protocol family 10
lo: Disabled Privacy Extensions
IPv6 over IPv4 tunneling driver
.
Starting internet superserver: inetd.
Starting OpenBSD Secure Shell server: sshd.
Starting periodic command scheduler: crond.
```

INIT: Entering runlevel: 9

Debian GNU/Linux 4.0 emblinux ttyS0

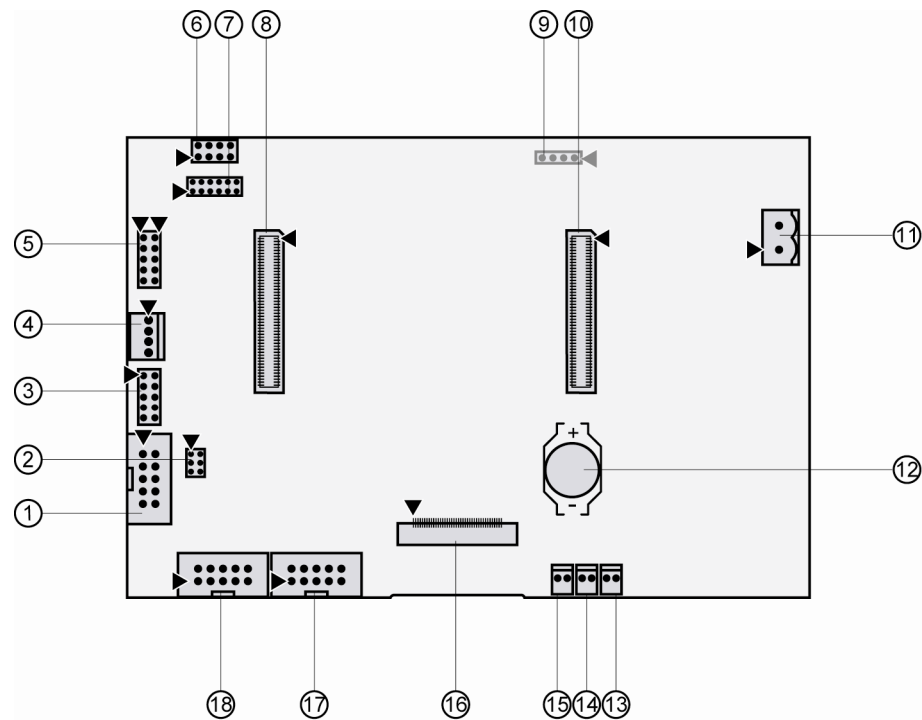
emblinux login:

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

## 4 BB6/ESOM HARDWARE REFERENCE

The following chapters describe the main hardware components of the BB6/eSOM.

### 4.1 BB6/eSOM Board Layout



- |  |                                    |
|--|------------------------------------|
| ① J7 - COM3 connector                  | ⑩ J1 - eSOM-200 module connector 1 |
| ② JP1 - COM3 termination jumper        | ⑪ J17 - Power connector            |
| ③ J8 - PIO connector                   | ⑫ BAT1 - Battery holder            |
| ④ J10 - 10/100 Mbps Ethernet connector | ⑬ J15 - Reset connector            |
| ⑤ J9 - USB1/USB2 connector             | ⑭ J11 - LAN LED connector          |
| ⑥ J14 - CAN/SPI connector              | ⑮ J16 - Power LED connector        |
| ⑦ JP2 - CAN mode jumper                | ⑯ J12 - LCD connector              |
| ⑧ J2 - eSOM-200 module connector 2     | ⑰ J6 - COM2 connector              |
| ⑨ J13 - Touch connector (bottom side)  | ⑱ J5 - COM1 connector              |

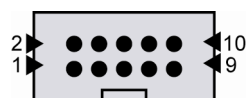
**Fig. 29: Board layout of BB6/eSOM**

**Please note:** Before using the CAN, SPI, PIO and USB connectors, please contact our support staff at [support@ist1.de](mailto:support@ist1.de).

## 4.2 Pinout COM1 Connector – J5

Pin	Name	Function
1	DCD	COM1 Serial Port, DCD Pin
2	DSR	COM1 Serial Port, RXD Pin
3	RXD	COM1 Serial Port, TXD Pin
4	RTS	COM1 Serial Port, DTR Pin
5	TXD	Ground
6	CTS	COM1 Serial Port, DSR Pin
7	DTR	COM1 Serial Port, RTS Pin
8	RI	COM1 Serial Port, CTS Pin
9	GND	COM1 Serial Port, RI Pin
10	---	Not connected

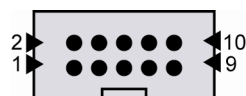
**Table 4: Pinout COM1 connector**



## 4.3 Pinout COM2 Connector – J6

Pin	Name	Function
1	DCD	COM2 Serial Port, DCD Pin
2	DSR	COM2 Serial Port, RXD Pin
3	RXD	COM2 Serial Port, TXD Pin
4	RTS	COM2 Serial Port, DTR Pin
5	TXD	Ground
6	CTS	COM2 Serial Port, DSR Pin
7	DTR	COM2 Serial Port, RTS Pin
8	RI	COM2 Serial Port, CTS Pin
9	GND	COM2 Serial Port, RI Pin
10	---	---

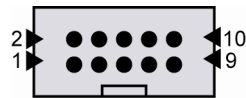
**Table 5: Pinout COM2 connector**



## 4.4 Pinout COM3 Connector – J7

Pin	Name	Function
1	---	---
2	---	---
3	RX/TX+	COM3 Serial Port, RX/TX+ Pin (RS485)
4	RX/TX-	COM3 Serial Port, RX/TX- Pin (RS485)
5	---	---
6	---	---
7	---	---
8	---	---
9	---	---
10	---	---

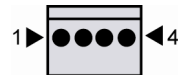
Table 6: Pinout COM3 connector



## 4.5 Pinout 10/100 Mbps Ethernet Connector – J10

Pin	Name	Function
1	TX+	10/100 Mbps LAN, TX+ Pin
2	TX-	10/100 Mbps LAN, TX- Pin
3	RX+	10/100 Mbps LAN, RX+ Pin
4	RX-	10/100 Mbps LAN, RX- Pin

Table 7: Pinout 10/100 Mbps Ethernet connector



## 4.6 Pinout Power Connector – J17

Pin	Name	Function
1	Vin	Power In 12..24 VDC
2	GND	Ground

Table 8: Pinout power connector



**CAUTION:** Providing the BB6/eSOM with a voltage higher than the regular 24 VDC  $\pm 10\%$  could cause damaged board components!



## 5 HELPFUL LITERATURE

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- Base Board BB6/eSOM hardware reference manual
- eSOM/2586 hardware reference manual
- Vortex86DX documents: <http://www.vortex86dx.com>

## CONTACT

---

### SSV Embedded Systems

Heisterbergallee 72

D-30453 Hannover

Phone: +49 (0)511/40 000-0

Fax: +49 (0)511/40 000-40

E-mail: [sales@ist1.de](mailto:sales@ist1.de)

Internet: [www.ssv-embedded.de](http://www.ssv-embedded.de)

Support: [www.ssv-comm.de/forum](http://www.ssv-comm.de/forum)

## DOCUMENT HISTORY

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Revision	Date	Remarks	Name
1.0	2009-04-07	first version	WBU
1.1	2009-05-12	Changed "embedded user interface" into "operator touch panel"	WBU
1.2	2009-05-19	Errors in board layout corrected	WBU

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