

# DNP/SK23-WCE Windows CE Starter Kit

# **First Steps**



#### SSV Embedded Systems

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# **1** INTRODUCTION

The DIL/NetPC DNP/9200 Starter Kit contains everything you need to get started with your Atmel AT91RM9200 ARM9-based embedded networking application. The Starter Kit includes a DNP/9200 module with a preinstalled U-Boot boot loader and Windows CE, the Evaluation Board DNP/EVA9, power supply, serial interface (null modem) cable, a CD-ROM with software and documentation and a printed user manual for the first steps with the Starter Kit.

For using the DNP/SK23 Windows CE Starter Kit you need a PC-based development system. The minimal configuration for this system is a Windows XP-based PC with a free COM port (COM1, COM2 or USB-based COMx) for the RS232 serial link and a 10/100 Mbps LAN interface with TCP/IP support for an Ethernet link to Windows CE.

The RS232 serial link allows the communication with the DNP/9200 U-Boot boot loader. This software component supports the download of a new Windows CE image file to the DNP/9200 Flash memory. The Ethernet link is necessary for Telnet-based user communication, FTP-based file transfers and HTTP-based web access to the Windows CE embedded servers.

# 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
italic	Filenames, user inputs and command lines
monospace	Pathnames, internet addresses and program code

Table 1: Conventions used in this Document



## 1.3 Features and Technical Data

The DIL/NetPC DNP/9200 comes with a preinstalled U-Boot boot loader and a Windows CE operating system. The DNP/9200 Windows CE consists of two main components within one image file: 1. the Windows CE kernel and 2. the root file system (Windows CE file system).

The DNP/9200 U-Boot boot loader allows the downloading of new Windows CE kernel versions and root file systems to the DNP/9200 RAM and Flash. This in-system programming feature can be used by a simple serial and Ethernet link between the development system and the DNP/9200.

- DIL/NetPC DNP/9200 with Atmel AT91RM9200, 16 MByte Flash and 32 MByte SDRAM
- U-Boot boot loader and Windows CE preinstalled in Flash memory
- Evaluation Board DNP/EVA9
- Null modem cable
- Ethernet LAN cross-over cable
- 110 VAC or 230 VAC to 5 VDC international power supply
- CD-ROM with SDK, TFTP server and FTP client software
- Printed hardware reference and user manuals
- HTTP (web) server setup sample
- FTP server setup sample
- Telnet server setup sample (Windows CE Telnet service)



# 2 GETTING STARTED

### 2.1 Serial Link between DNP/EVA9 and PC

Setup the serial link between the Evaluation Board DNP/EVA9 and your PC. Use a null modem cable for this connection.



Figure 1: Serial link between Evaluation Board and PC

Connect one end of the null modem cable with an unused COM port of your PC. Make sure that this PC COM port supports 115.200 bps.



## 2.2 Ethernet Link between DNP/EVA9 and PC

Setup the Ethernet LAN link between the Evaluation Board DNP/EVA9 and your PC. Use an Ethernet cross-over cable or a switch-based infrastructure for the first LAN connection.





#### Figure 2: Ethernet link between Evaluation Board and PC

make sure that your PC can work with the IP address range 192.168.0.x.

Please note: The DNP/9200 comes with the default IP address 192.168.0.126. Please



Figure 3: Switch-based Ethernet link between Evaluation Board and PC

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

Connect a 5 VDC power supply with a 5.5 mm x 2.5 mm jack plug to the Evaluation Board DNP/EVA9.



Figure 4: Power supply for the Evaluation Board



**CAUTION:** Providing the DNP/EVA9 with a voltage higher than the regular 5 VDC  $\pm 10\%$  could resolve in damaged board components!

Please pay attention to the polarity of the power connector: the + pole is in the center!



Figure 5: Polarity of the power connector



**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 or a similar simple terminal emulation program.

Verbinden mit	? 🛛
💫 DIL-NetPC	
Geben Sie die Rufnu	ımmer ein, die gewählt werden soll:
Land/Region:	Deutschland (49)
Ortskennzahl:	0511
Rufnummer:	
Verbindung herstellen über:	COM5
	OK Abbrechen

#### Figure 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.

Anschlusseinstellungen
Bits pro Sekunde: 115200
Datenbits: 8
Parität: Keine 🗸
Stoppbits: 1
Flusssteuerung: Kein 🗸
Wiederherstellen
OK Abbrechen Übernehmen

#### Figure 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 DNP/9200 with RCM enabled

After power-up the DIL/NetPC DNP/9200 starts an automatic boot process from the onboard Flash memory chip. This process consists of two steps:

- The DNP/9200 runs the U-Boot boot loader program. This software shows a wait message over the DNP/9200 COM1 serial interface if the RCM jumper is available (RCM enabled). Please see the DIL/NetPC DNP/9200 Hardware Reference Manual for details. It is possible to interrupt the boot process and switch to the U-boot command line interface (U-Boot CLI). Just hit a key of your terminal emulation program.
- 2. Without interruption the U-Boot boot loader starts the Windows CE image after the wait period from the DNP/9200 Flash memory.



**Figure 8:** Booting process after the U-Boot boot delay

Without the RCM jumper (RCM disabled) there is no wait time and absolutely no output to the DNP/9200 serial interface COM1. The port is free for application usage.



**Please note:** The U-Boot command line interface (CLI) allows you to change the wait time of the first step. Please see the U-Boot environment variable boot delay for details.



# 2.6 Checking the 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. Use 192.168.0.1 or 192.168.0.254 for your PC and 192.168.0.126 for the DNP/5370.

💁 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	
C:\Dokumente und Einstellungen\kdw>	
	-

Figure 9: Windows-PC IP address check with *ipconfig* 

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



# 2.7 Checking the Ethernet-based TCP/IP Communication

Check the Ethernet-based TCP/IP communication between the DNP/9200 and the PC with a simple *ping* command.

es Eingabeaufforderung	- 🗆 ×	
Microsoft Windows XP [Version 5.1.2600] (C) Copyright 1985-2001 Microsoft Corp.	<u>^</u>	
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 = Oms, Maximum = 1ms, Mittelwert = Oms		
C:\Dokumente und Einstellungen\kdw>		
		1
<u>۱</u>		111

Figure 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.



## 2.8 Using a Telnet Connection

Run a Telnet client program on your PC with the IP address of the DIL/NetPC DNP/9200. You can use a Telnet session with the Windows CE Telnet service for entering commands on the Windows CE command line interface (CLI).



Figure 11: Run the Windows telnet client program

Please use the CLI also for the user access to the Windows CE file system. This CLI offers commands for directory change, file copy, file delete and more.

S Telnet 192.168.0.126		- 🗆 ×
Welcome to the Windows CE Te	lnet Service on WindowsCE	<u> ۸</u>
Pocket CMD v 5.0		
The following commands are a ATTRIB set/display CALL Call batch s CDUE Call batch s CDUE Canage direc CHOIR Same as CD. CCS COPY Coppilies. DATE Diplices of the sc COPY Coppilies. DATE Diplices of the sc Command HELP Print content HELP Print help f GOTO Transfer con IF Conditional MOVE Same as MD. MOVE Same as MD. MOVE Assessory of the sc PAUSE Suspend configure PAUSE Suspend configure PAUSE Suspend configure PAUSE Same as RD. Self Same as RD. SEIT Set on list SHAFT Same the detach TYPE Coutput conte STAFT Staft detach TYPE Coutput content of the sc Command name! to d HELP CMD to display help on	vailable: file attributes. cript. tory. reen. system date. ts of a directory. on the screen or change echoing parameters. interpreter. or command interpreter or individual commands. trol to a label in batch processing. y execute a command. ectory. files. T PATH. ution of a batch file. system prompt. t working directory. tory. nts in batch file. name. environment variables. nts of a batch file. d process. system form a CMD.EXE session. nts of a file or files to the screen. isplay extended help for given command, or general topics such as edirection or CMD parameters.	
Directory of N		
0/07/03 12/00a (DIR) 01/01/03 04:00a (DIR)	Application Data www 23 Control Panel.lnk My Documents Program Files profiles Temp Windows	
Found 8 file(s). Total s 1 Dir(s) 10657532 bytes	ize 23 bytes. free	
		~

Figure 12: Using Pocket CMD commands within a Telnet client window



## 2.9 Checking the Embedded Web Server

The DIL/NetPC DNP/9200 default Windows CE configuration comes with a preinstalled embedded web server (also called **HTTP server**). The object storage space (HTML pages, pictures, CGI programs, Java Applets ...) for this web server is located within the Windows CE file system.

Telnet 192.168.0.126		- 🗆 ×
∖> cd www \www> dir		<u> </u>
Directory of Nwww		
01/01/03 12:08p 01/01/03 04:00a 01/01/03 04:00a 01/01/03 04:00a 01/01/03 04:00a 01/01/03 04:00a 01/01/03 04:00a 01/01/03 04:00a	1407 current-httpd.log 769 ssvlogo.gif 1771 spacer2.gif 5165 sadnp022.gif 12665 pinout.htm 10154 index.html 4835 dnp0071.htm	
Found 7 file(s). Total size 3 1 Dir(s) 10657532 bytes free	36766 bytes.	
\www> <b></b>		•
		▶ // <sub>1</sub>

Figure 13: The files within the directory \www

Run your PC web browser and access the HTML file index.html. Use the following URL within the browser address field:

http://192.168.0.126/index.html



Figure 14: Check the embedded web server with the Internet Explorer



## 2.10 Checking the FTP Server

First install the FileZilla FTP client on your PC. The installation file for this FTP client is a part of the DNP/9200 Windows CE Starter Kit CD-ROM.

FileZilla version 2.2.32		_ 🗆 🔀
File Edit Transfer View Queue Server Help		
👼 • 📴 🖌 🗨 🛛 🔯 🖓 🖉 🎯 R 💡 Address:	User: Password: Port: Quickgonnect	
Local Site: C:\tftpboot\DNP9200-Samba\	Remote Site:	~
DNP9200-Samba	Filename Filesize Filetype Date Time Permissions	
IGW920-Samba		
Filename / Filesize Filetype Last Modif	if .	
<b>_</b>		
at91_mci.ko 8 KB KO-Datei 20.07.200	Dé	
autostart.sh 291 SH-Datei 26.10.200	D'	
dnp9200-samba.sh 3 MB SH-Datei 07.08.200	DT.	
LCD_test 6 KB Datei 04.04.200	DT	
mmc_block.ko 8 KB KO-Datei 20.07.200	De	
mmc_core.ko 23 KB KO-Datei 20.07.200	Uf	
mountmmc.sn 350 SH-Datei 20.07.200		
Samba3-ByEXample.pui 4 MB Adobe Acrobat 14.11.200		
Samples vis 245 KB Microsoft Evcel. 26 10 200	с. п	
<		
10 files with 12238395 bytes.		
Local Filename Size Direction Remot	ote Filename Host Status	
Ready	Queue: 01	oytes 🧿 🏟 ; ;

Figure 15: The user interface of the FileZilla FTP client

Then run FileZilla and select the menu item **Edit => Settings**. Set on the **Connection** window the default password for anonymous login to your e-mail address and click on OK.

FileZilla Options	
Connection Firewall settings Firewall settings Firewall settings GSS support Directory cache Ident server SFTP settings File transfer settings GSCII/Binary Speed Limit Compression Interface settings Local file list Remote file list Remote file list Language Miscellaneous CAC	Connection       FileZilla         Keep Alive Settings <ul> <li>Enable the Keep Alive system</li> <li>Send Keep Alive commands like "PWD", "REST 0", "TYPE A", "TYPE I" at random intervals between</li> <li>15 and 30 seconds.</li> </ul> Timeout Detection       If zero bytes are transfered within 30 seconds, assume that the connection timed out and disconnect.         Retry Settings

Figure 16: First time configuration for the FileZilla FTP client



Enter the IP address 192.168.0.126 within the FileZilla address field and click on the **Quickconnect** button. Do not enter a user name and password. These items are supplied by FileZilla for anonymous FTP sessions.

🖬 FileZilla - Connected to 192.168.0.126											
File Edit Transfer View Queue Server Help											
💇 - 📴 🐂 🛛 📰	🔹 🔍 🛛	🖉 R 🛛 📍	Address:	192.168.0.126	User:	anonymous	Password: ••	Po	t 21	Quick <u>c</u> onnect V	
Response: 227 Entering Pas Command: LIST Response: 125 Data connec Response: 226 Closing data Status: Directory listing sr Command: PWD Response: 257 "/".	sive Mode (1 ction already connection. uccessful	92,168,0,126,4,6). open; transfer starting	1.								~
Local Site: C:\tftpboot\DNP92	00-Samba\		~	Remote Site: 7							~
E-C tftpboot	0-Samba		<b>^</b>	Filename /		Filesize	Filetype Ordner	Date 01.01.2003	Time 12:00	Permissions	
	J-Samba		~	My Documents			Ordner	01.01.2003	04:00		
Filename /	Filesize	Filetype	Last Modif	Program Files			Ordner	01.01.2003	04:00		
<b>_</b>							Ordner	01.01.2003	04:00		
at91_mci.ko	8 KB	KO-Datei	20.07.2006	Windows			Ordner	01.01.2003	04:00		
autostart.sh	291 0 MD	SH-Datei	26.10.200.	C www			Ordner	01.01.2003	04:00		
CD test	2 MD 2 MD	Datei	07.00.200.	Control Panel.In	<	23	Verknüpfung	01.01.2003	04:00		
mms block ko	0 10	Ko Datoi	20.07.200	Samba3-ByExam	ple.pdf	3773455	Adobe Acro	01.01.2003	14:38		
	23 KB	KO-Datei	20.07.2000	Samba3-HOWTO	.pdf	5578072	Adobe Acro	01.01.2003	14:38		
Dimountmmc.sh	350	SH-Datei	20.07.2006								
Samba3-ByExample.odf	4 MB	Adobe Acrobat	14.11.2006								
Samba3-HOWTO.pdf	6 MB	Adobe Acrobat	01.08.2003								
Samples.xls	245 KB	Microsoft Excel	26.10.200								
<	1111		>								
Selected 2 files with 9351527 by	/tes.			7 folders and 3 files	with 935:	1550 bytes.					
Local Filename		Size Directio	on Remot	e Filename		Host	Status				
Ready										Queue:	0 bytes   🍳 🧉 📑

Figure 17: FTP-based file transfers between Remote Site and Local Site window

After a successful connection to the FTP server FileZilla offers a Remote Site window with the DNP/9200 file system. It is now possible to transfer files between the Local Site window and the Remote Site window. Just use drag-n-drop for these FTP-based file transfers.

In Telnet 192.168.0.126	- 🗆 🗙
∨ dir Directory of ∖	
01/01/03       02:38p       3773455       Samba3-ByExample.pdf         01/01/03       02:38p       5578072       Samba3-HOWIO.pdf         01/01/03       12:00p       (DIR)       Application Data         01/01/03       04:00a       VOIR>       www         01/01/03       04:00a       23       Control Panel.lnk         01/01/03       04:00a       VOIR>       My Documents         01/01/03       04:00a       VOIR>       Program Files         01/01/03       04:00a       VOIR>       Profiles         01/01/03       04:00a       VOIR>       Hemp         01/01/03       04:00a       VOIR>       Windows	
Found 10 file(s). Total size 9351550 bytes. 1 Dir(s) 3022708 bytes free	
	-

Figure 18: The new files within the DNP/9200 Windows CE file system



# **3 U-BOOT COMMAND OVERVIEW**

The user interface to U-Boot consists of a **command line interpreter** (CLI), much like a simple shell prompt. When connected via a serial line you can interactively enter commands and see the results. The following table shows the available U-Boot commands for the DIL/NetPC DNP/9200.

Command	Function				
autoscr	run script from memory				
base	print or set address offset				
bdinfo	print Board Info structure				
bootm	boot application image from memory				
bootp	boot image via network using BootP/TFTP protocol				
bootd	boot default, i.e., run 'bootcmd'				
cmp	memory compare				
ср	memory copy				
crc32	checksum calculation				
echo	echo args to console				
erase	erase FLASH memory				
flinfo	print FLASH memory information				
go	start application at address 'addr'				
help	print online help				
iminfo	print header information for application image				
loadb	load binary file over serial line (kermit mode)				
loadc	load binary file over serial line (ymodem-c mode)				
loadg	load binary file over serial line (ymodem-g mode)				
loads	load S-Record file over serial line				
Іоор	infinite loop on address range				
md	memory display				
mm	memory modify (auto-incrementing)				
mtest	simple RAM test				
mw	memory write (fill)				
nm	memory modify (constant address)				
printenv	print environment variables				
protect	enable or disable FLASH write protection				
rarpboot	boot image via network using RARP/TFTP protocol				
reset	perform RESET of the CPU				
run	run commands in an environment variable				
saveenv	save environment variables to persistent storage				
setenv	set environment variables				
sleep	delay execution for some time				
tftpboot	boot image via network using TFTP protocol and env variables ipaddr and serverip				
version	print monitor version				
?	alias for 'help'				

 Table 3:
 U-Boot command overview



# 4 POCKET CMD 5.0 COMMAND OVERVIEW

The Windows CE Telnet service offers a **command line interpreter** (CLI) called **Pocket CMD v 5.0**. This user interface allows you to communicate with the DNP/9200 Windows CE shell. The following table shows the available commands.

Command	Function				
ATTRIB	Set/display file attributes				
CALL	Call batch script				
CD	Change directory				
CHDIR	Same as CD				
CLS	Clear the screen				
COPY	Copy files				
DATE	Display/set system date				
DEL	Delete a file				
DIR	Print contents of a directory				
ECHO	Echo output on the screen or change echoing parameters				
ERASE	Same as DEL				
EXIT	Exit command interpreter				
HELP	Print help for command interpreter or individual commands				
GOTO	Transfer control to a label in batch processing				
IF	Conditionally execute a command				
MD	Create a directory				
MKDIR	Same as MD				
MOVE	Move/rename files				
PATH	Alias for SET PATH				
PAUSE	Suspend execution of a batch file				
PROMPT	Reconfigure system prompt				
PWD	Print current working directory				
RD	Remove directory				
REM	Record comments in batch file				
REN	Change file name				
RENAME	Same as REN				
RMDIR	Same as RD				
SET	Set or list environment variables				
SHIFT	Shift arguments of a batch file				
START	Start detached process				
TIME	Display/change system time				
TITLE	Set the window title for a CMD.EXE session				
TYPE	Output contents of a file or files to the screen				

 Table 4:
 Windows CE Pocket CMD v 5.0 command overview



# 5 HELPFUL LITERATURE

- Atmel AT91RM9200 data sheet summary
- Atmel AT91RM9200 user guide
- ARM ARM926EJ-S technical reference manual
- ARM ARM9EJ-S technical reference manual
- DIL/NetPC DNP/9200 hardware reference manual (SSV Starter Kit item)
- Evaluation Board DNP/EVA9 hardware reference manual (SSV Starter Kit item)

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For actual information about the DNP/SK23-WCE visit us at www.dilnetpc.com.

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