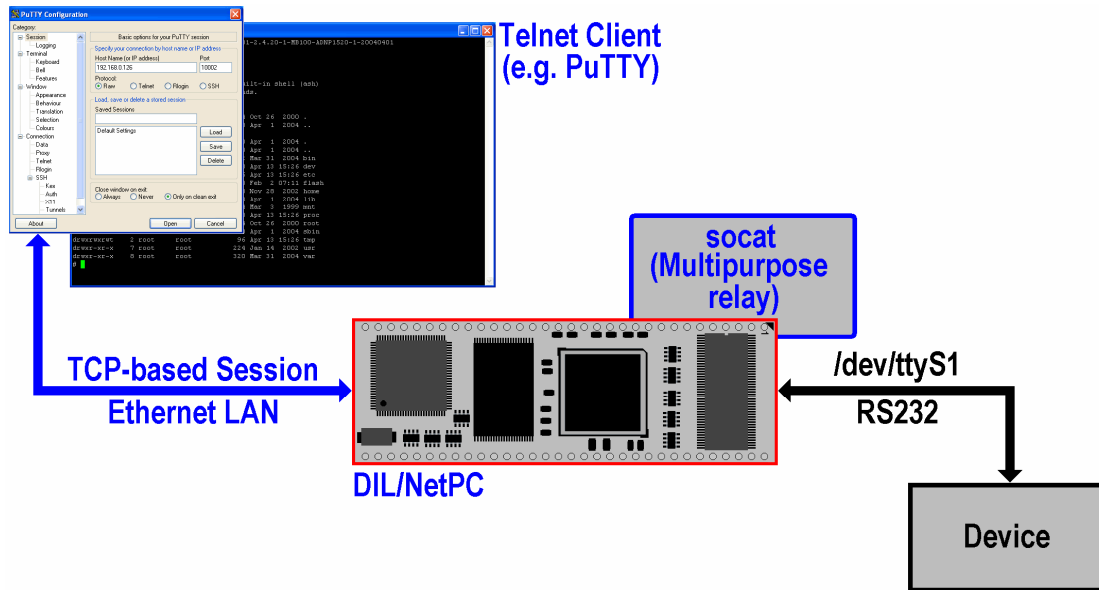# How to use the DNP/SK23 as a RS232-based Device Server

The DIL/NetPC DNP/9200 starter kit CD-ROM (versions after April 2006) comes with the pre-build *socat* utility program. This utility allows you to access an external device with RS232-based user interface on DNP/9200 serial port COM2 over a TCP-based Telnet session. The following picture illustrates the details (please note: the COM2 port is the DIL/NetPC DNP/9200 Linux device */dev/ttyS1*).

Socat is a command line based utility that establishes two bidirectional byte streams and transfers data between them. Because the streams can be constructed from a large set of different types of data sinks and sources (see address types), and because lots of address options may be applied to the streams, *socat* can be used for many different purposes (e.g. as bidirectional byte stream connection between a TCP-based socket and RS232-based serial port).

- **1. Step:** Setup a serial console or Telnet-based session to the DIL/NetPC DNP/9200 on your DNP/SK9. Copy the files *autostart.sh* and *socat-armv4* via TFTP or FTP from the CD-ROM directory */linux/socat* to the DNP/9200 directory */flash*. Assign executable rights to the file *socat-armv4*. Then display the content of *autostart.sh*.

```
cd /flash
tftp –g –l autostart.sh 192.168.0.1
tftp –g –l socat–armv4 192.168.0.1
chmod +x socat–armv4
cat autostart.sh
#!/bin/sh
cd /flash
while true ; do
    ./socat–armv4 TCP4–LISTEN:10002 /dev/ttyS1,b115200,raw,echo=0
done
```
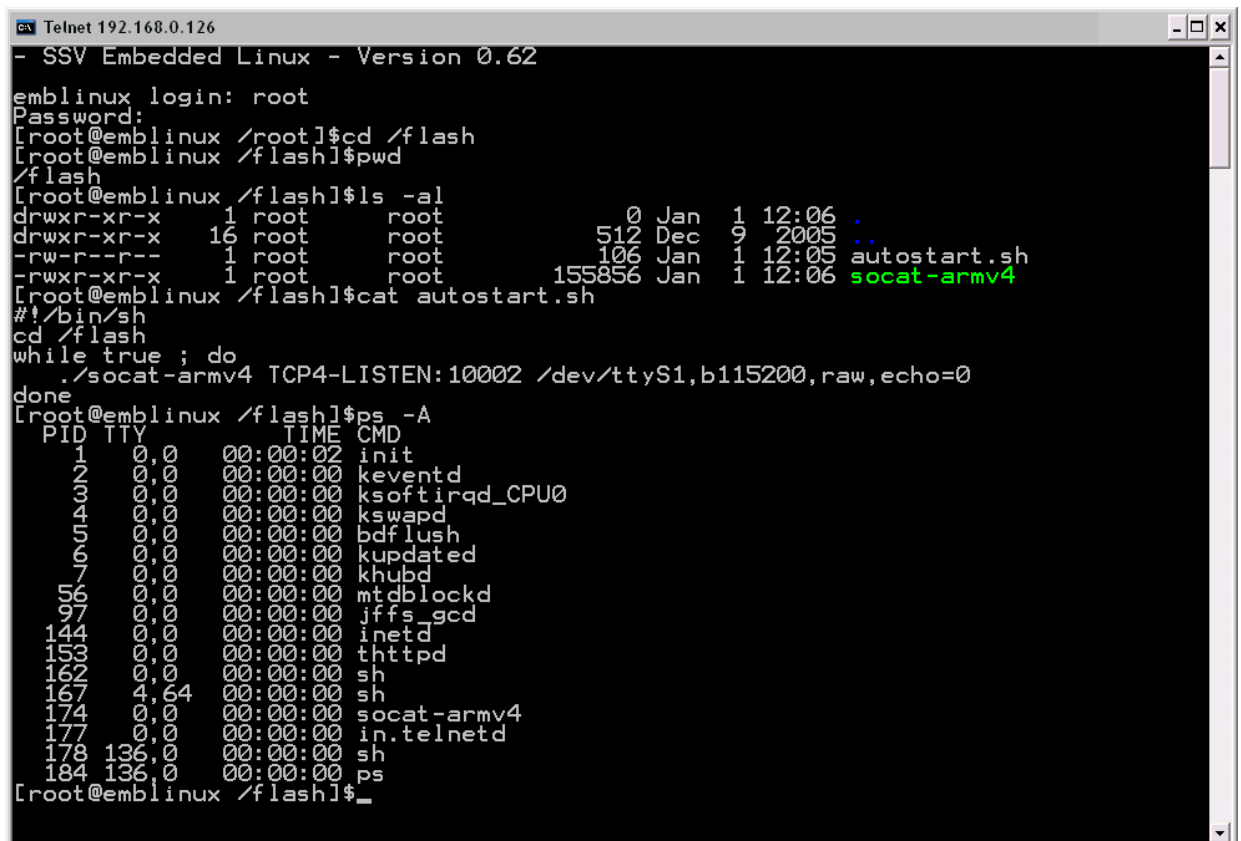
Thi *autostart.sh* script file runs *socat* after each power-up or reset sequence. The first parameter

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TCP4-LISTEN:10002 specifies a TCP server with socket number 10002. This server is one bi-directional byte stream endpoint for *socat*.

The second parameter */dev/ttyS1,b115200,raw,echo=0* defines the serial interface */dev/ttyS1* also as a bi-directional byte stream endpoint for *socat*. This interface is the COM2 RS232 serial port connector of the DNP/EVA9 (connected to the DNP/9200 COM2 serial interface). The parameter parts *b115200*, *raw* and *echo=0* set special communication features for COM2 (e.g. *b115200* set the COM2 speed to 115.200 bps).

If a TCP-based session to the DNP/9200 is active, *socat* receives bytes over the TCP socket 10002 and transmits these bytes over COM2 to an external device. On the other hand, all bytes which COM2 receives from the external device are transferred to the TCP socket.

- **2. Step:** Reboot your DNP/9200. Then enter *ps –A* within a serial console or Telnet-based session. This Linux command shows all processes. The DNP/9200 runs *socat* as a process.

```
Telnet 192.168.0.126                                                  _ □ x
- SSV Embedded Linux - Version 0.62

emblinux login: root
Password:
[root@emblinux /root]$cd /flash
[root@emblinux /flash]$pwd
/flash
[root@emblinux /flash]$ls -al
drwxr-xr-x    1 root     root            0 Jan  1 12:06 .
drwxr-xr-x   16 root     root          512 Dec  9  2005 ..
-rw-r--r--    1 root     root          106 Jan  1 12:05 autostart.sh
-rwxr-xr-x    1 root     root       155856 Jan  1 12:06 socat-armv4
[root@emblinux /flash]$cat autostart.sh
#!/bin/sh
cd /flash
while true ; do
    ./socat-armv4 TCP4-LISTEN:10002 /dev/ttyS1,b115200,raw,echo=0
done
[root@emblinux /flash]$ps -A
  PID TTY          TIME CMD
    1   0,0    00:00:02 init
    2   0,0    00:00:00 keventd
    3   0,0    00:00:00 ksoftirqd_CPU0
    4   0,0    00:00:00 kswapd
    5   0,0    00:00:00 bdflush
    6   0,0    00:00:00 kupdated
    7   0,0    00:00:00 khubd
   56   0,0    00:00:00 mtdblockd
   97   0,0    00:00:00 jffs_gcd
  144   0,0    00:00:00 inetd
  153   0,0    00:00:00 thttpd
  162   0,0    00:00:00 sh
  167   4,64   00:00:00 sh
  174   0,0    00:00:00 socat-armv4
  177   0,0    00:00:00 in.telnetd
  178 136,0    00:00:00 sh
  184 136,0    00:00:00 ps
[root@emblinux /flash]$_
```
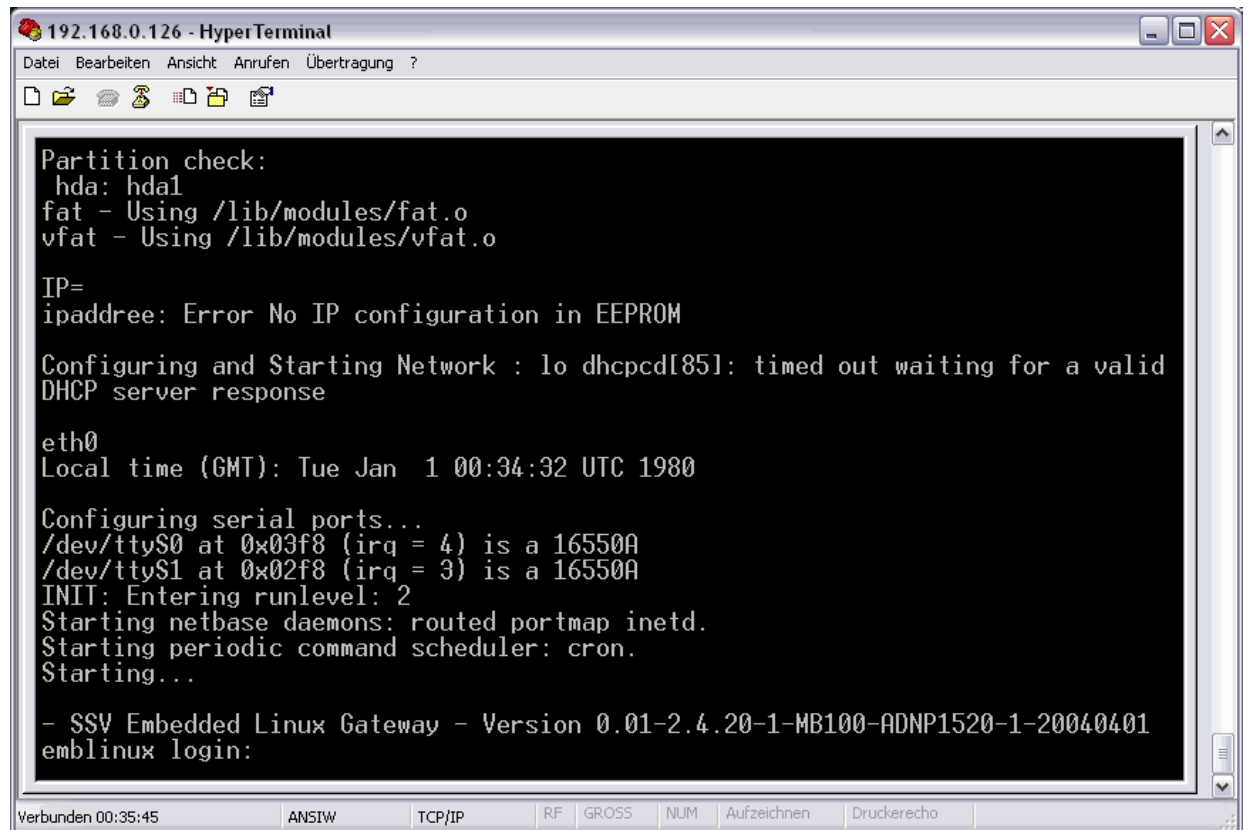
- **3. Step:** Connect an external device to the COM2 RS232 serial port connector of the DNP/EVA9. Make sure that this device is using the serial port parameters:

  - 115.200 bps
  - 8 data bits
  - 1 stop bits
  - No parity bit
  - Handshaking disabled

A second DIL/NetPC starter kit is good test equipment for an external device simulation.

- **4. Step:** Use the LAN connection to the DNP/9200 Ethernet interface and run a Telnet client program. Please use *PuTTY* or *HyperTerminal* in TCP mode on your Windows-based PC. Connect this Telnet client to the IP address *192.168.0.126* and port *10002*.

  Please note: The DIL/NetPC DNP/9200 comes with factory setup *192.168.0.126* as IP address.

```
192.168.0.126 - HyperTerminal
Datei  Bearbeiten  Ansicht  Anrufen  Übertragung  ?

Partition check:
 hda: hda1
fat - Using /lib/modules/fat.o
vfat - Using /lib/modules/vfat.o

IP=
ipaddree: Error No IP configuration in EEPROM

Configuring and Starting Network : lo dhcpcd[85]: timed out waiting for a valid
DHCP server response

eth0
Local time (GMT): Tue Jan  1 00:34:32 UTC 1980

Configuring serial ports...
/dev/ttyS0 at 0x03f8 (irq = 4) is a 16550A
/dev/ttyS1 at 0x02f8 (irq = 3) is a 16550A
INIT: Entering runlevel: 2
Starting netbase daemons: routed portmap inetd.
Starting periodic command scheduler: cron.
Starting...

- SSV Embedded Linux Gateway - Version 0.01-2.4.20-1-MB100-ADNP1520-1-20040401
emblinux login:

Verbunden 00:35:45      ANSIW      TCP/IP      RF  GROSS  NUM  Aufzeichnen  Druckerecho
```

It is now possible to control the external device on COM2 over the Telnet session. The picture above shows a sample with a DIL/NetPC ADNP/1520 connected via a null modem cable to the COM2 RS232 serial port connector of the DNP/EVA9 evaluation board.

That's all.