◇ **syslog**ic

Windows CE 5.0 for IPC/NETIPC

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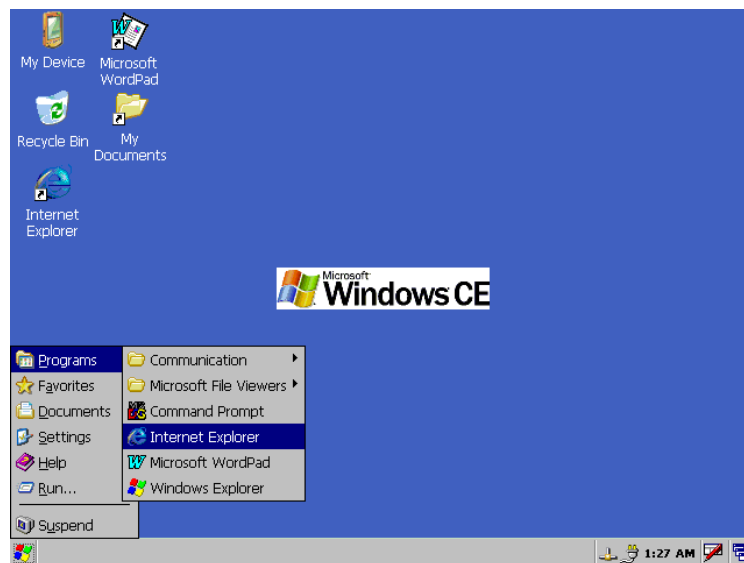
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1.0	09.11.2005	S.Wyss	-
1.1	24.11.2005	S.Wyss	after review with DB
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1   Introduction

1.1.   Abstract

This document covers the setup and use of *Windows CE 5.0* on the *IPC/NETIPC* family of industrial PC's.

The first chapters describe some basic configuration options for building a customized image with the "Microsoft Platform Builder" tool. For most users, this is not a necessary thing to do. If you just want to use a standard windows CE image provided by Syslogic, you can directly jump to chapter 4.

In chapter 4 and the following chapters, the procedure for setting up a IPC/NETIPC board to boot Windows CE is described. This is followed by an usage example of the Remote Registry editor tool that ships with "Microsoft Platform Builder" or with "Microsoft Embedded Visual C++".

The Microsoft tools referenced here are not part of this product but must be purchased separately from a Microsoft product distributor. The "Platform Builder" tool is only needed for customizing your own Windows CE image (chapters 1 to 3 of this user guide). If you just want to run a standard Windows CE 5.0 image on a IPC/NETIPC board, there's no need for the "Platform Builder" tool.

Supported are the following processor boards from the board manufacturer Syslogic:
    IPC/NETIPC-2A, IPC/NETIPC-3A, IPC/NETIPC-5A and IPC/NETIPC-6A

1.2.   Hardware Overview

Table 1 compares the basic hardware differences among the IPC/NETIPC family members that we are going to setup in the Windows CE Platform Builder Software.

Processor Board	Clock	RAM	Graphics Controller	USB	Network Card
NETIPC-2A	133MHz	64MB	STPC	no	NE2000
NETIPC-3A	133MHz	64MB	STPC	no	LAN91C111
NETIPC-5A	200MHz	128MB	SILICON MOTION	yes, 1.0 OHCI	STE10/100A
NETIPC-6A	500MHz	256MB	AMD GEODE	yes, 2.0 OHCI	INTEL PRO

Table 1 – Hardware Overview

2 Platform Builder Setup

2.1. Installation of Platform Builder

Platform Builder requires the Microsoft .NET Framework to run. Please download and install the "Microsoft .NET x.x redistributable" package from the developer website of Microsoft:
http://www.msdn.microsoft.com/

After installing the .NET 1.1 redistributable, install the Windows CE 5.0 "Platform Builder" tool with default settings. The target source code directory must be **C:\WINCE500** (mandatory!).

2.2. Installation of Device Drivers

Decompress **BSP_DRIVERS.ZIP** from the CD-ROM folder **DRIVERS** into a local folder on your development PC with an archive utility (e.g. WinZip) and install only the following device drivers from the corresponding folders:
- **STPC Consumer II BSP.msi**
- **Ste100.msi**
- **TSHARCCE50PS2111a.msi**
- **STPC Vega BSP.msi**

2.3. Patching the Sources

The complete WinCE 5.0 source directory is approximately 2.2 GBytes in data size, thus it is not practical for distribution. Instead, we exchange/patch only the specific files needed to run IPC/NETIPC processor boards.

Extract the archive **NETIPCx_PATCH.zip** (where x stands for the hardware model of your NETIPC) file from the directory **PATCHES** of the CD-ROM with a file archive utility (e.g. WinZip). Please note that you must set up your archive utility to **preserve the absolute path** information of all files contained in the .zip archive (Extraction **destination folder is C:**).

The patch just executed consists of a few directories and files that were exchanged in the source tree. The following listing shows which files are affected (listed for reference only):

for IPC/NETIPC-6
- *C:\WINCE500\PBWorkspaces\NETIPC6_WORKSPACE*.**
- *C:\WINCE500\PLATFORM\Windsor*.**

for IPC/NETIPC-5
- *C:\WINCE500\PBWorkspaces\NETIPC5_WORKSPACE*.**
- *C:\WINCE500\PLATFORM\Stpc_vega*.**

for IPC/NETIPC-3
- *C:\WINCE500\PBWorkspaces\NETIPC3_WORKSPACE*.**
- *C:\WINCE500\PLATFORM\Stpc_consumer_ii*.**

for IPC/NETIPC-2
- *C:\WINCE500\PBWorkspaces\NETIPC2_WORKSPACE*.**

- *C:\WINCE500\PLATFORM\Stpc_consumer_ii*.**

common files:
- *C:\WINCE500\PUBLIC\COMMON\OAK\CSP\X86\OAL\debug.c*
- *C:\WINCE500\PUBLIC\COMMON\OAK\CSP\X86\OAL\oeminit.asm*
- *C:\WINCE500\PLATFORM\COMMON\SRC\X86\COMMON\OTHER\debug.c*

Important: The patches for each NETIPC family member interfere (see common files above). You can only have one patch for one CPU board installed on your development PC at the same time.

The patches implement the following functionality:
- touch driver enabled instead of PS/2 mouse (only IPC/NETIPC-5A and IPC/NETIPC-6A)
- maximum available RAM enabled.
- No debug output on COM1. COM1 is a normal COM Port.

2.4.   Opening the Workspace in Platform Builder

Open the workspace (e.g. for NETIPC6) by double-clicking the file **NETIPC6_WORKSPACE.pbxml** in **C:\WINCE500\PBWorkspaces\NETIPC6_WORKSPACE** directory. You can build an image by selecting "Build and Sysgen" from the menu "Build OS" in Platform Builder (please verify that "Clean before Building" in the menu "Build OS" is enabled).

Note: When first building an image after patching the sources, the build tool may halt with some errors. When running the build process a second time, these errors should disappear. One complete "Build and Sysgen" operation (with "Clean before Building" enabled) takes approximately ½ hour to finish.

3   Image Customization

3.1.   General

It is beyond the scope of this application note to give you a complete tutorial in using the Platform Builder Tool. In general, you can add or remove feature components to/from your target within Platform Builder. This is a simple drag-and-drop procedure from the feature catalog to your image workspace.

If you are new with Platform Builder, please read the product documentation that's shipping with the tool. The following links point to a few tutorials on how to work with the Platform Builder and how to customize your own image.

Online Audio-Visual Windows CE 5.0 Tutorials:
http://msdn.microsoft.com/embedded/getstart/basics/tutorialsce/default.aspx

Online Windows CE Product Documentation:
http://msdn.microsoft.com/library/default.asp?url=/library/en-us/dnanchor/html/windowsce.asp

Quite often, the catalog features that you select for your image need to be configured with some registry key entries. These registry entries can be found in the parameter panel of the Platform Builder Tool. The most important registry files are: **platform.reg**, **common.reg** and **project.reg**. (which all get merged into one big registry file during the sysgen phase)

3.2.   Standard Functionality included

The standard images (see CD-ROM directory IMAGES) provide some basic functionality. The following list is not complete but summarizes some features included:

- FTP Server
- Active Sync File Synchronization Tool
- COM1 to COM2 serial ports enabled, no debug output on COM1
- LAN Ethernet with fixed IP (192.168.1.220) or DHCP
- USB (Mouse, Keyboard and Storage Device included)
- Kernel Transport KITL
- Hive Based Registry (portions of the registry are stored permanently)
- Windows CE SDK (with Compact .NET Framework)
- Internet Explorer and Shell with Network Tools
- Hyperterminal Client
- Word Pad Text Editor Application

3.3. TCP/IP Configuration

The TCP/IP settings are stored into the registry of the Windows CE image where you can edit them with the Remote Registry editor (see chapter 6). In case you need to customize the image, you can change the default IP configuration in the registry source files in Platform Builder.

3.3.1. for IPC/NETIPC-6A

The TCP/IP settings for IPC/NETIPC-6A can be found in the file ***platform.reg***, accessible from the parameter view panel of Platform Builder. Table 2 details the registry nodes concerning TCP/IP setup.

```
[HKEY_LOCAL_MACHINE\Comm\PCI\STE1001\Parms\TcpIp]
    "EnableDHCP"=dword:0                          ; use 0 for static IP, 1 for DHCP
    "DNS"="192.168.1.1"
    "DefaultGateway"="192.168.1.1"
    "UseZeroBroadcast"=dword:0
    "IpAddress"="192.168.1.220"
    "Subnetmask"="255.255.252.0"
```

Table 2 – TCP/IP registry settings for 6A

3.3.2. for IPC/NETIPC-5A

The TCP/IP settings for IPC/NETIPC-5A can be found in the file:
    *C:\WINCE500\PLATFORM\Stpc_vega\Src\Drivers\STE100**Ste100.reg***
The corresponding Registry key is the following:
    [HKEY_LOCAL_MACHINE\Comm\PCI\STE1001\Parms\TcpIp]

3.3.3. for IPC/NETIPC-3A

The TCP/IP settings for IPC/NETIPC-3A can be found in the file ***project.reg***, accessible in the parameter view panel of Platform Builder.
The corresponding Registry key is the following:
    [HKEY_LOCAL_MACHINE\Comm\LAN90001\Parms\TcpIp]

3.3.4. for IPC/NETIPC-2A

The TCP/IP settings for IPC/NETIPC-2A can be found in the file ***platform.reg***, accessible in the parameter view panel of Platform Builder
    [HKEY_LOCAL_MACHINE\Comm\NE20001\Parms\TcpIp]

3.4. Serial Port configuration

In the file **platform.reg** (accessible from the Parameter View panel in Platform Builder) you can define the serial COM port base adresses and IRQs. Note that SysIntr = IRQx + 0x10. The following settings (bold) for serial port 1 to serial port 2 has been setup as default by syslogic.

```
[HKEY_LOCAL_MACHINE\Drivers\BuiltIn\Serial]
  "SysIntr"=dword:14
  "IoBase"=dword:03F8
…
[HKEY_LOCAL_MACHINE\Drivers\BuiltIn\Serial2]
  "SysIntr"=dword:13
  "IoBase"=dword:02F8
…
```

Table 3 – Serial Port settings

3.5. Enable PS/2 Mouse instead of Touch Screen

Remove the **Drivers/Touch/PS2 TSHARC Touch Screen** component from your workspace and "Build and Sysgen" the image.

4   Image Deployment

4.1.   General

There is a complete file system on the CD-ROM (folder TARGET) that must be copied to a Compact Flash card together with the WinCE 5.0 image (named nk.bin). If you have built your own customized image, then you can transfer your image from the release directory of Platform Builder to the Compact Flash card. (image path e.g. C:\WINCE500\PBWorkspaces\NETIPC5_WORKSPACE\RelDir\STPC_VEGA_x86_Release\nk.bin)

4.2.   Standard Images

For your first tests, you can deploy a standard image from the CD-ROM directory **IMAGES** (the image needs to be unzipped first with an archive utility, e.g. WinZip). We provide standard images for all IPC/NETIPC family members. For IPC/NETIPC-5A and -6A architecture, you can choose between Touch Screen functionality enabled or disabled.

4.3.   Procedure

You have two options to download the image onto the Compact Flash card for booting a IPC/NETIPC device. For both options in common, you must prepare the Compact Flash card first:

4.3.1.   Make Compact Flash Card bootable

Instructions for preparing the Compact Flash card to be bootable:
-    Insert the Compact Flash card into the IPC/NETIPC target and boot from drive A: (continuously press DEL key at powerup, adjust CMOS BIOS settings to boot from drive A:).
-    After Embedded DOS Rom has started, format the Compact Flash card with the command **format c: /s**. (Compact Flash card should boot now, you can test it by adjusting BIOS settings to boot from C:)

4.3.2.   Card Reader File Download

In case you have a Compact Flash Card reader at your disposal, then you can directly copy the Windows CE file system from the CD-ROM directory TARGET to the Compact Flash card by means of the Card Reader.

-    Copy all files from the **TARGET** directory of the CD-ROM onto the CF card.
-    Copy the WinCE-image **nk.bin** from the release directory (you can also use a standard image from the CD-ROM directory IMAGES) onto the CF card.
-    Eject the Compact Flash card from the card reader and insert it into the target device.
-    Boot the target **from drive C:** (adjust BIOS to boot from C:) and see WinCE 5.0 starting.

4.3.3. FTP File Download

It is also possible to download the file system and image over a Ethernet connection directly onto the compact flash card inserted in the target device. Therefore you must have an Ethernet connection from the development PC to the target device.

- Copy the directories **UTIL** and **TARGET** from the CD-ROM onto your local development PC. Then, copy the Windows CE image (**nk.bin**) into that local directory named TARGET.
- connect the target and your development PC with an Ethernet cable.
- boot the IPC/NETIPC target from drive A: (adjust BIOS settings) and start the remote console on the target device with the command **rconsole.bat**
- execute **transfer.bat** on your development PC from the directory UTIL to download the files.
- On the target device, execute **unzip archiv.zip**
- reboot the target **from drive C:** (adjust BIOS to start from C:) and watch WinCE 5.0 starting.

5 Boot Options

There are multiple ways to boot into a Windows CE 5.0 image. The standard way on a IPC/NETIPC device is to use the DOS bootloader *LoadCEPC.exe* that you find in the TARGET folder of the CD-ROM. The IPC/NETIPC first boots into a prepared Compact Flash card with Embedded DOS ROM (see 4.3.1) and then looks for an AUTOEXEC.BAT file to execute.
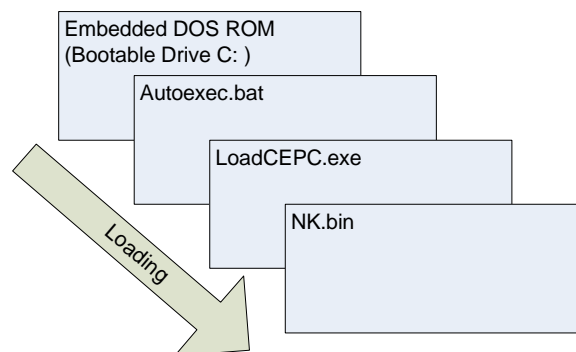

Figure 1 – OS Loading Stages

Within this AUTOEXEC.BAT, the WinCE Loader LoadCEPC.exe is called with boot arguments. These boot arguments can be specified in AUTOEXEC.BAT as listed below:

```
…
REM *** chose your graphic resolution ***
REM loadcepc /v /c:0 /L:640x480x16 C:\nk.bin
loadcepc /v /c:0 /L:800x600x16 C:\nk.bin
REM loadcepc /v /c:0 /L:1024x768x16 C:\nk.bin
…
```

Table 4 – Autoexec.bat settings

Comment in/comment out the appropriate call to loadCEPC.exe by deleting/adding the **rem** keyword in front of the line.

Hint: As Embedded DOS ROM has no editor included, you must edit AUTOEXEC.BAT on your local development PC and download it with FTP to the target device (boot target from a: and execute rconsole.bat – see 4.3.3). You can also **change the boot settings within Windows CE 5.0** for the following boot by opening the WordPad application after first booting and editing \CompactFlash\AUTOEXEC.BAT (In the File Open Dialog, you must **set File Type Filter to *.*** in order to display AUTOEXEC.BAT in its directory)

5.1.   Debug Serial Port

Syslogic has removed the kernel debug output on COM1 serial port to enable a custom application to use COM1. This is included in the patches discussed in subsection 2.3.

LoadCEPC option /c defines the serial COM port where the kernel debug output is applied. With option /c:0 specified (default in AUTOEXEC.BAT), there is no debug output on serial COM ports. Use option /c:1 to enable debug out on COM1.

This switch only works if you included the kernel KITL component (Menu Platform/Settings in Platform Builder) into your build and if you use loadCEPC as your boot loader. If you removed kernel KITL or use another boot loader without boot arguments, then you must make your own patches into the source files.

5.2.   Display Resolution

LoadCEPC option /L specifies the graphics resolution as listed in the frame above. You can choose 8, 16 or 24 bit color modes for every resolution. Standard Is 800x600 pixels at 16 bits.

5.3.   Differences with IPC/NETIPC-6A

IPC/NETIPC6 does not take boot argument from the CE bootloader loadCEPC.exe. The display resolution must be set directly in the registry of the running system. First make a ActiveSync or "Manual TCP/IP" Connection of the target and the host system and execute "Remote Registry Editor" from the host "Platform Builder". See section 6.2 for details.

6   Remote Tools

"Platform Builder" and "Embedded Visual C++" provide some remote tools that connect to the running CE target. These tools are based on a previously established connection to the CE target.

    1) Connect with Active Sync over Serial Line (COM).

    2) Connect with Manual Connection over Ethernet (TCP/IP).

Prior to working with Active Sync, the tool must be installedon the host system and a connection must be created on the CE target. This is detailed in the next section.

6.1.   Active Sync Installation

- Install the ActiveSync Host application on the host system from the CD-ROM.
- Open the ActiveSync application and click on the menu item "Connection settings". Make sure that the "Allow serial cable or infrared connection to this COM port:" is checked and targets to COM1.
- On the target CE device, and create a new connection as shown in the following figures:
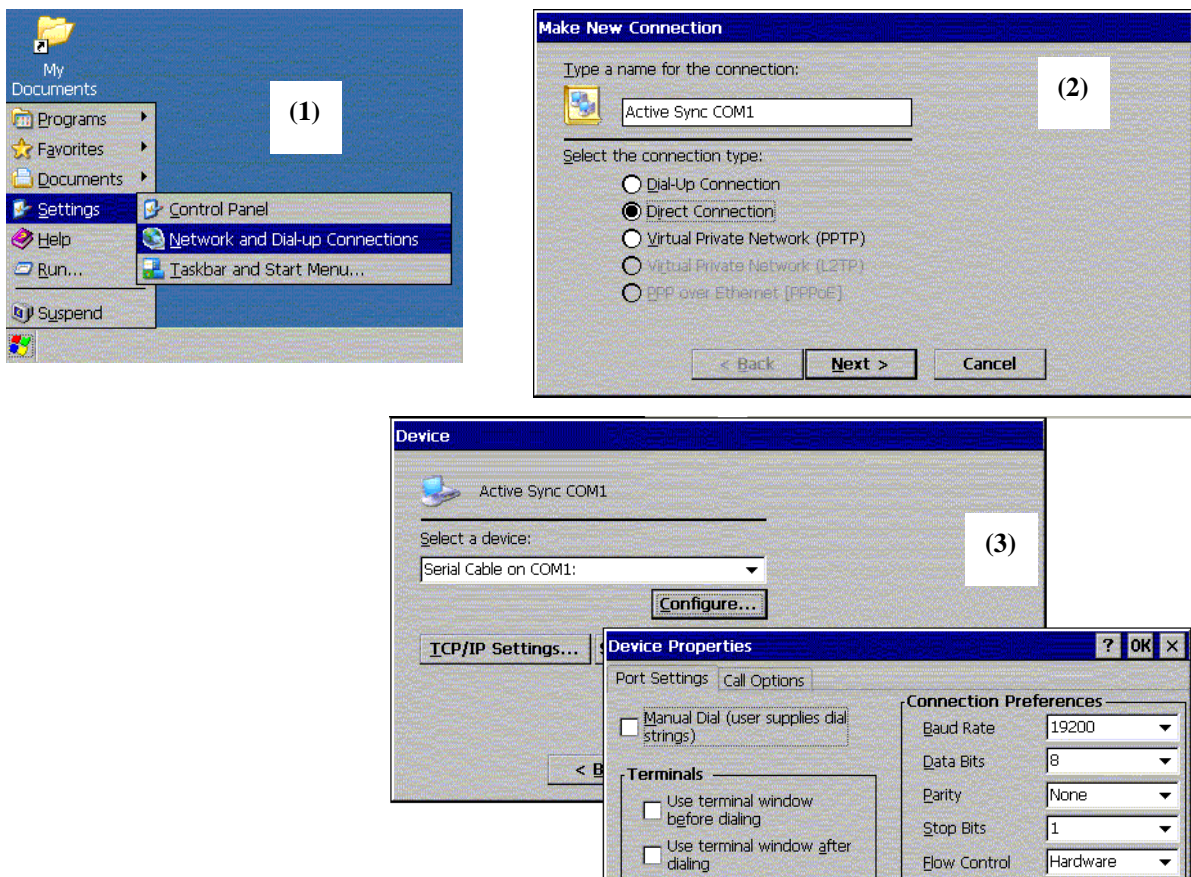

Figure 2 – Active Sync Target Configuration

- After setting up everything as shown in the images above, your target device accepts incoming connections on the COM port. Change to the host Active Sync Application and hit "Get Connected".

6.2. Remote Tools Example

In the following sections we are going to use the remote "Registry Editor" tool to change the graphic resolution of the IPC/NETIPC-6A device. We do not use Active Sync but set up a "Manual TCP/IP transport" connection in this example.

- Start "Platform Builder (PB)" or "Embedded Visual C++ (EVC++) and choose "Remote Registry Editor" from the "Tools" menu.
- Click "Cancel" on the following dialog.
- Choose "Connection – Configure Windows CE Platform Manager".
- Select "Windows CE Default Platorm / Default Device" and hit "Properties". the following dialog will show up:
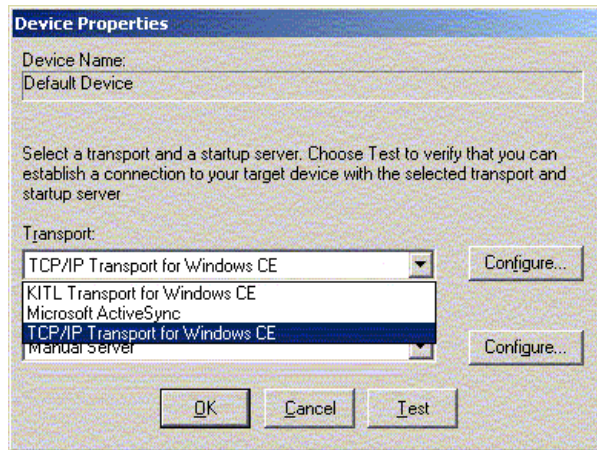
Figure 3 - Transport Selection

- Now you can choose your preferred transport. You can select "Microsoft Active Sync" or "TCP/IP Transport for Windows CE" in the Transport Dropdown list.

6.3. „TCP/IP" Manual Transport

- Choose "TCP/IP Transport for Windows CE" in the dropdown list and hit the OK Button. The following window will show up:
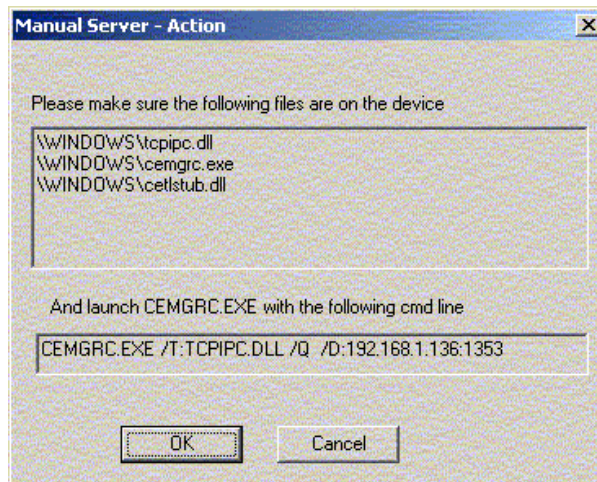

Figure 4 – Manual Server command line

- Change to the CE target and open a command shell (Start menu/Run – enter "cmd" in edit field). Start the TCP/IP server with the exact command shown in the "Manual Server – Action" window of your host (this may differ from the command line shown in figure Figure 4 – Manual Server command line),
- On the host, click OK to connect with the target. The connection status will be reported and you should be connected to the CE target.
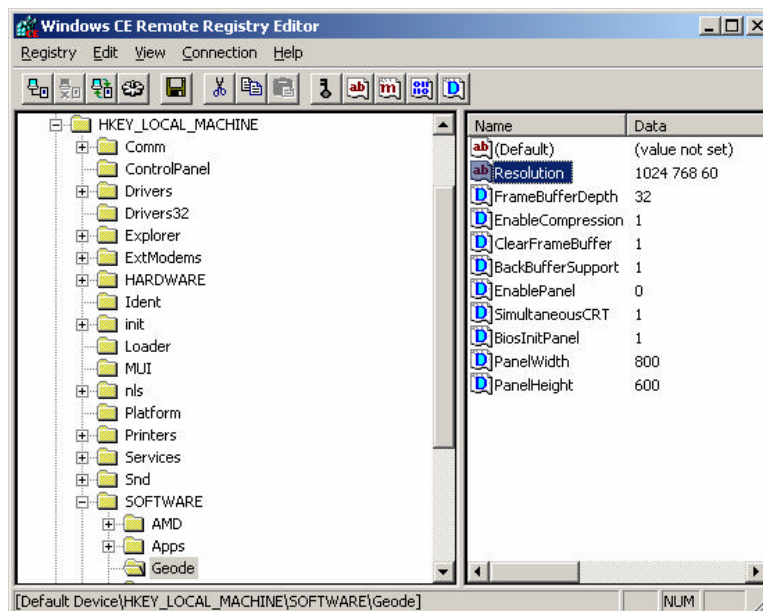

Figure 5 – Remote Registry editor

Within the Remote Registry editor window of the host, navigate to the registry node
[HKEY_LOCAL_MACHINE\SOFTWARE\Geode] and set the resolution key to one of the following modes:

VGA setting	@ 60Hz	Resolution key value = 640 480 60
SVGA setting	@ 60Hz	Resolution key value = 800 600 60
VGA setting	@ 60Hz	Resolution key value = 1024 768 60

Table 5 – Serial Port settings

It is important to save the registry on the IPC/NETIPC target. This can be accomplished by executing the "Start/Suspend" entry in the Start menu of the Windows CE target system. After a reboot, the new resolution will be present.

7 References

- Syslogic firmware documentation
  (Document Order code: DOC/NETIPCFW-E), available at 'www.syslogic.ch'.
- IPC/NETIPC processor board user documentation
  (Document Order code: DOC/NETIPC-E), available at 'www.syslogic.ch'.

8 General Remarks

The content and presentation of this document has been carefully checked. No responsibility is accepted for any errors or omissions in the documentation. Note that the application note is constantly revised and improved. The right to change this documentation at any time without notice is therefore reserved. Syslogic is grateful for any help referring to errors or suggestions for improvements.

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