Telit wireless solutions

HE Windows CE 5 User Guide

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Making machines talk.

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Applicable Products

Product
HE863-EUx
HE910

Contents

1. Introduction

1.1. Scope

This user guide serves the following purpose:

- Provides details about the TELIT MODULES architecture.
- Describes how to compile, include in a kernel image and use a TELIT MODULE Windows CE 5.0 USB driver for a headless system.

1.2. Audience

This User Guide is intended for software developers who develop applications using the HE Telit modem.

1.3. Contact Information, Support

For general contact, technical support, to report documentation errors and to order manuals, contact Telit’s Technical Support Center (TTSC) at:

TS-EMEA@telit.com
TS-NORTHAMERICA@telit.com
TS-LATINAMERICA@telit.com
TS-APAC@telit.com

Alternatively, use:
http://www.telit.com/en/products/technical-support-center/contact.php
For detailed information about where you can buy the Telit modules or for recommendations on accessories and components visit:
http://www.telit.com
To register for product news and announcements or for product questions contact Telit Technical Support Center (TTSC).
Our aim is to make this guide as helpful as possible. Keep us informed of your comments and suggestions for improvements.
Telit appreciates feedback from the users of our information.

1.4. Product Overview

HE modules contain a fully featured HSDPA modem and UMTS/GSM/GPRS module, compatible with the other Telit GSM/GPRS modules.

1.5. Document Organization

This manual contains the following chapters:

- "Chapter 1, Introduction" provides a scope for this manual, target audience, technical contact information, and text conventions.
- "Chapter 2, System setup" describes how to add the Telit HE USB driver in a Windows CE 5.0 image.
- "Chapter 3, Device Driver" describes how to use the Telit HE USB driver for interacting with the chosen modem.

1.6. Text Conventions

This section lists the paragraph and font styles used for the various types of information presented in this user guide.

STOP *Danger – This information MUST be followed or catastrophic equipment failure or bodily injury may occur.*

⚠ *Caution or Warning – Alerts the user to important points about integrating the module, if these points are not followed, the module and end user equipment may fail or malfunction.*

ℹ **Tip or Information – Provides advice and suggestions that may be useful when integrating the module.**

Format	Content
`Arial monospaced`	Windows CE shell commands at command prompt, filesystem paths, source code examples and menu items

All dates are in ISO 8601 format, i.e. YYYY-MM-DD.

1.7. Document history

Revision	Date	Changes
ISSUE #0	2011-05-03	First Release

ISSUE #1	2011-11-03	Second Release, update for HE910 module

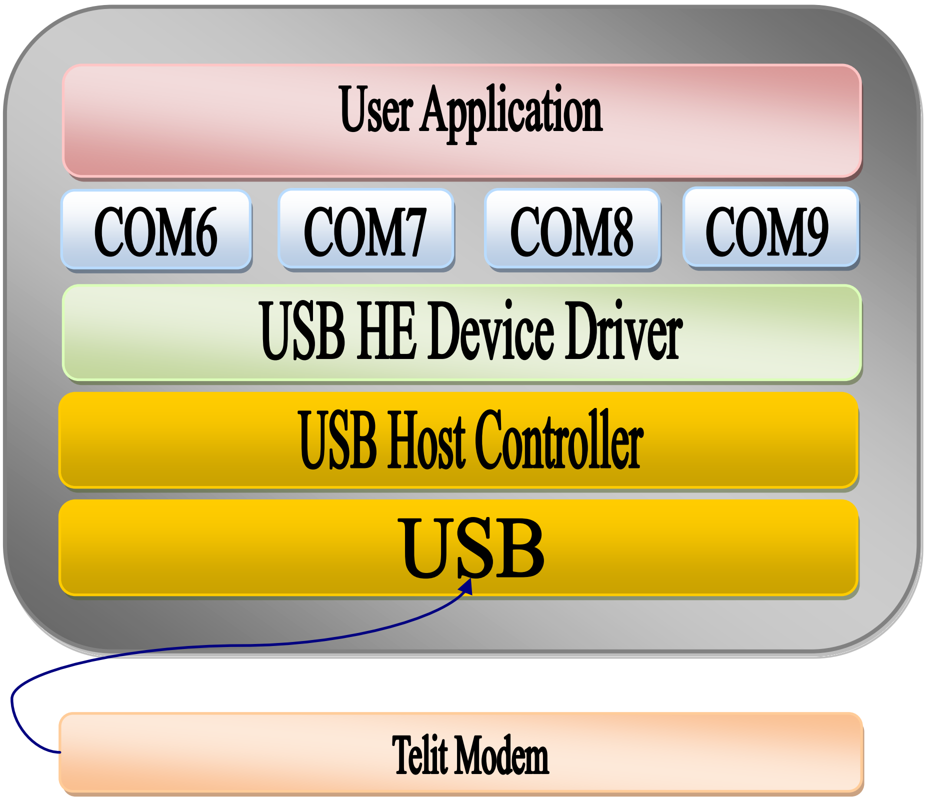
2. System setup

In this chapter it is described the general architecture of a Windows CE system with attached an HE Telit module, the requirements needed for using the HE Telit module and how to integrate the HE device driver in a Windows CE image. The following table shows the reference platforms which this guide has been tested for:

Device	Operating System
AT92SAM9263	Windows CE 5.0

2.1. General Overview

In the following image it is shown a diagram of USB software/hardware interaction in a Windows CE system with a HE module attached:



From the bottom of the stack:

- TELIT MODULE: Telit modem connected through an USB port.
- USB: serial bus for interfacing devices to a host computer.
- USB Host Controller: a combination of hardware and software that is responsible for the following actions:

    - Detecting the insertion and removal of USB devices
    - Managing flow control between the host and USB devices
    - Managing data flow between the host and USB devices

  - Collecting status
  - Providing power to attached USB devices

- USB TELIT MODULE Device Driver: piece of software that allows the TELIT MODULE to be seen by the user application as connected through serial ports rather than USB port.
- Virtual serial ports (COM6, COM7, COM8 and COM9): serial ports created by the TELIT MODULE device driver for accessing the modem; they can be used as real physical serial ports.

HE:

  - COM6: Telit HSDPA modem port, used for normal modem/application interaction (e.g. AT commands sending, data connection…).
  - COM7: Telit on COM7.
  - COM8: Telit on COM8.
  - COM9: Telit Auxiliary, used for normal modem/application interaction (e.g. AT commands sending, data connection…).

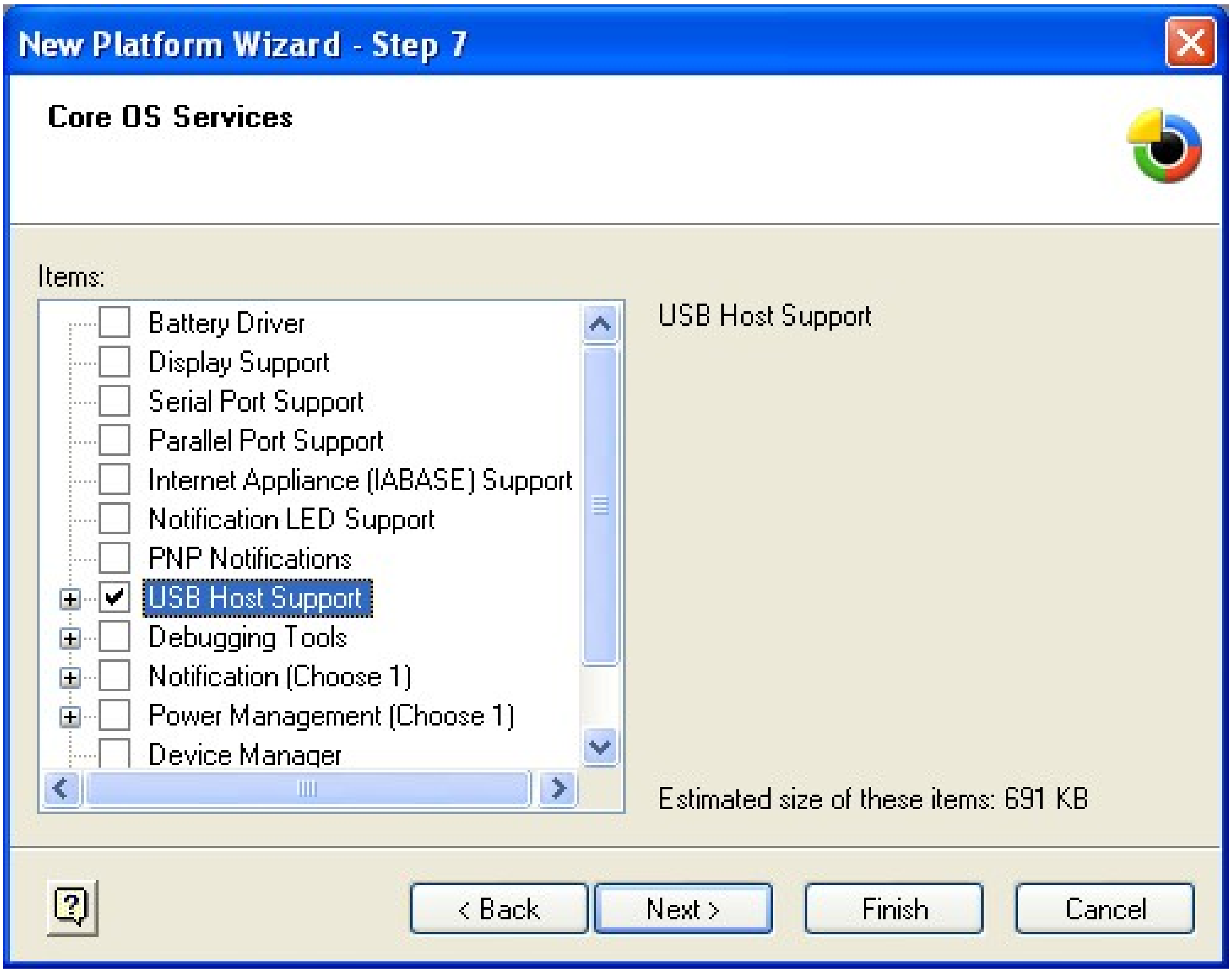
- User Application: piece of software written by the customer that uses TELIT MODULE features through virtual serial ports.

2.2. Pre-requirements

For correctly building a Windows CE 5.0 image with the TELIT MODULE USB driver on a headless system the following pre-requirements need to be satisfied:

- Microsoft Platform Builder for CE 5.0.
- An OS design with the USB host controller supported.
- Knowledge of Windows CE OS image and subproject creation.

Please note that there are different ways for enabling the USB host controller and they depend on the considered hardware. In our test platform the USB host controller can be enabled during the initial image creation wizard (in the Core OS Services step), as the following image suggests:



New Platform Wizard - Step 7

Core OS Services

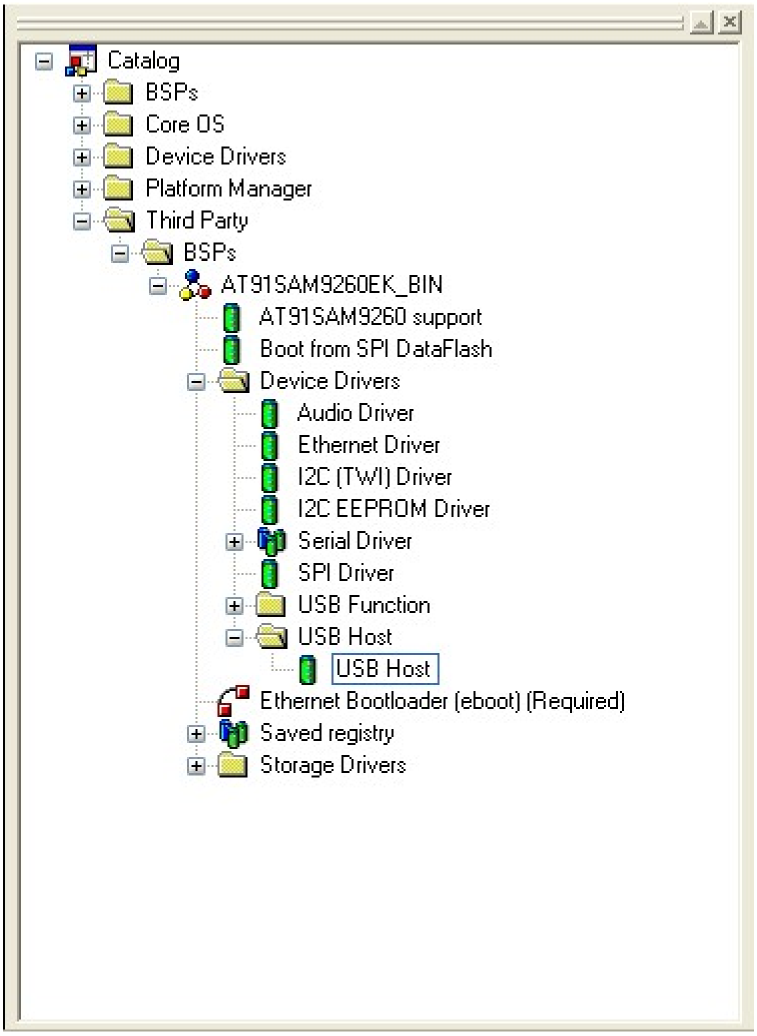
Items:

- ☐ Battery Driver
- ☐ Display Support
- ☐ Serial Port Support
- ☐ Parallel Port Support
- ☐ Internet Appliance (IABASE) Support
- ☐ Notification LED Support
- ☐ PNP Notifications
- ☑ USB Host Support
- ☐ Debugging Tools
- ☐ Notification (Choose 1)
- ☐ Power Management (Choose 1)
- ☐ Device Manager

USB Host Support

Estimated size of these items: 691 KB

or it can be added using the catalog as the following image suggests:



Please note again that this step could be different for your platform.

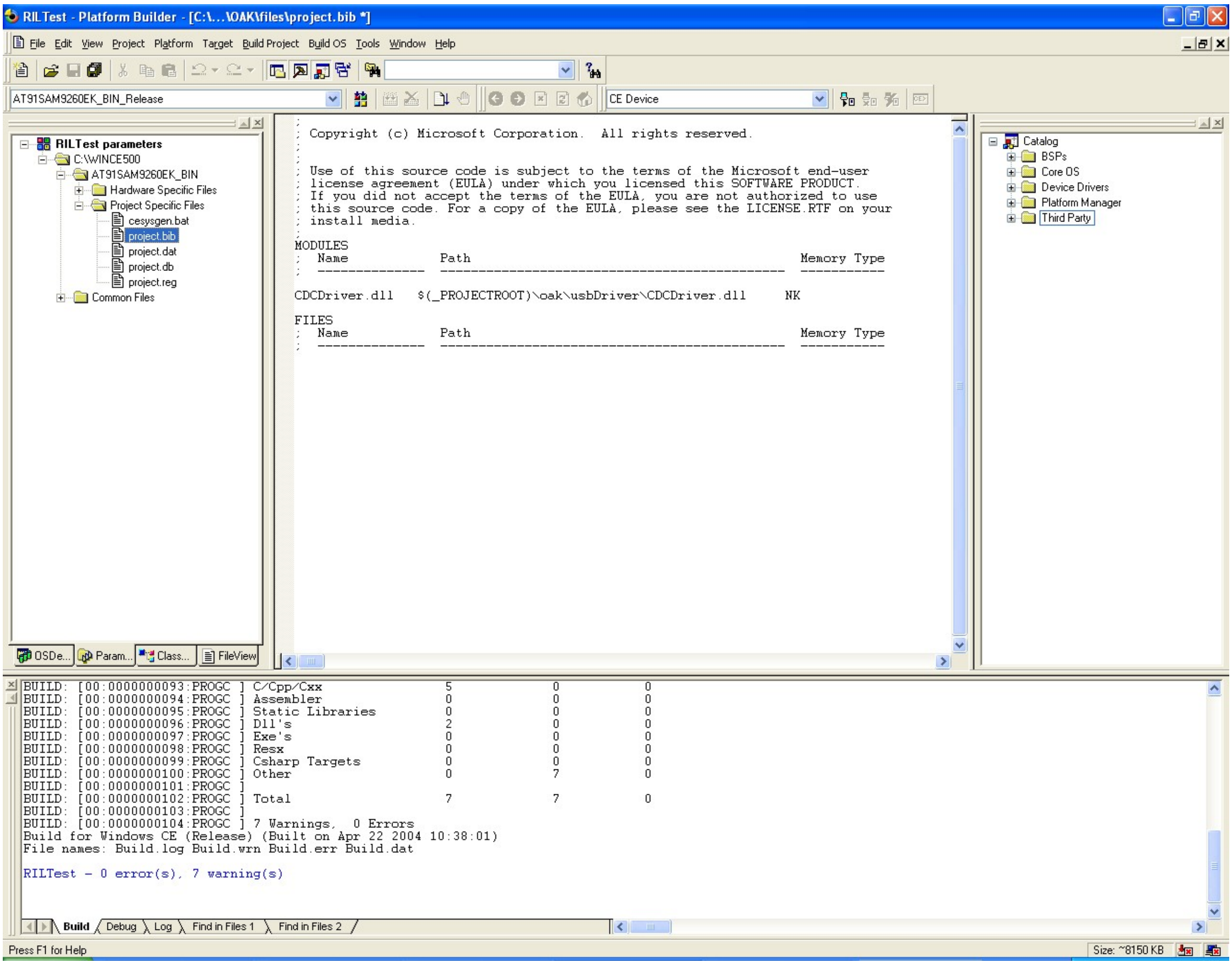
2.3. Adding HE TELIT MODULE support in the OS image - Using the binary

For adding HE TELIT MODULE support in the OS image, having the binary *CDCACM.dll*, follow these steps:

- In the *ParameterView*, under the folder *Project Specific Files* open the file *project.bib*. Under the *Modules* section add the following line:

  ```
  CDCACM.dll
  $(_PROJECTROOT)\[path_where_the_dll_is]\CDCACM.dll       NK
  ```

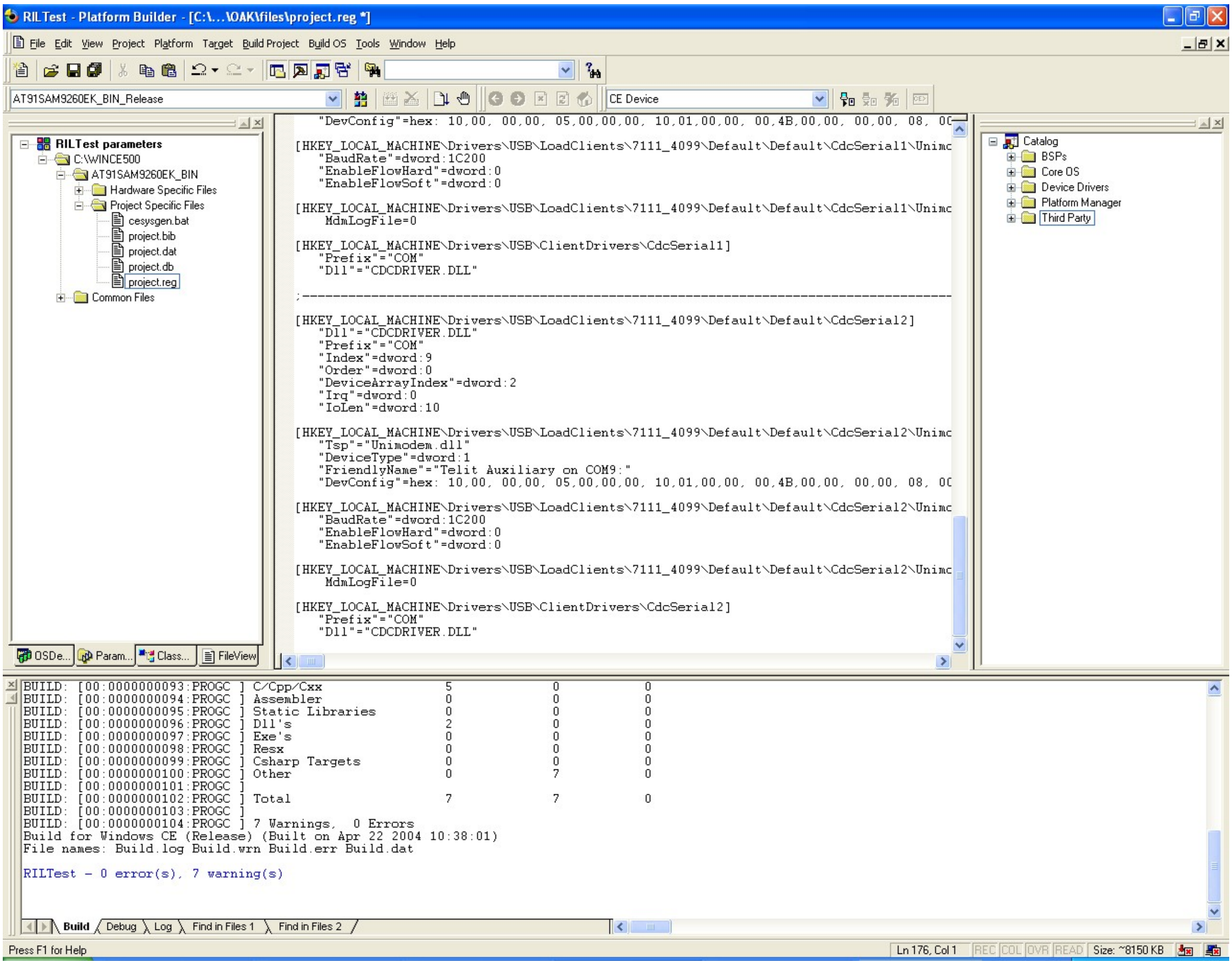
  paying attention to change the path to the correct one (the place where the dll can be found).



```
;
; Copyright (c) Microsoft Corporation.  All rights reserved.
;
;
; Use of this source code is subject to the terms of the Microsoft end-user
; license agreement (EULA) under which you licensed this SOFTWARE PRODUCT.
; If you did not accept the terms of the EULA, you are not authorized to use
; this source code. For a copy of the EULA, please see the LICENSE.RTF on your
; install media.
;
MODULES
;  Name            Path                                           Memory Type
;  --------------  ---------------------------------------------  -----------

CDCDriver.dll   $(_PROJECTROOT)\oak\usbDriver\CDCDriver.dll     NK

FILES
;  Name            Path                                           Memory Type
;  --------------  ---------------------------------------------  -----------
```

```
BUILD: [00:0000000093:PROGC ] C/Cpp/Cxx                 5             0            0
BUILD: [00:0000000094:PROGC ] Assembler                 0             0            0
BUILD: [00:0000000095:PROGC ] Static Libraries          0             0            0
BUILD: [00:0000000096:PROGC ] Dll's                     2             0            0
BUILD: [00:0000000097:PROGC ] Exe's                     0             0            0
BUILD: [00:0000000098:PROGC ] Resx                      0             0            0
BUILD: [00:0000000099:PROGC ] Csharp Targets            0             0            0
BUILD: [00:0000000100:PROGC ] Other                     0             7            0
BUILD: [00:0000000101:PROGC ]
BUILD: [00:0000000102:PROGC ] Total                     7             7            0
BUILD: [00:0000000103:PROGC ]
BUILD: [00:0000000104:PROGC ] 7 Warnings,  0 Errors
Build for Windows CE (Release) (Built on Apr 22 2004 10:38:01)
File names: Build.log Build.wrn Build.err Build.dat

RILTest - 0 error(s), 7 warning(s)
```

- Open the file *project.reg* and, at its end, paste the content of the file *CDCACMDriver_HEXXX.reg* where XXX is the module that you are going to use.



```
    "DevConfig"=hex: 10,00, 00,00, 05,00,00,00, 10,01,00,00, 00,4B,00,00, 00,00, 08, 00

[HKEY_LOCAL_MACHINE\Drivers\USB\LoadClients\7111_4099\Default\Default\CdcSerial1\Unimo
    "BaudRate"=dword:1C200
    "EnableFlowHard"=dword:0
    "EnableFlowSoft"=dword:0

[HKEY_LOCAL_MACHINE\Drivers\USB\LoadClients\7111_4099\Default\Default\CdcSerial1\Unimo
     MdmLogFile=0

[HKEY_LOCAL_MACHINE\Drivers\USB\ClientDrivers\CdcSerial1]
    "Prefix"="COM"
    "Dll"="CDCDRIVER.DLL"

;------------------------------------------------------------------------------------

[HKEY_LOCAL_MACHINE\Drivers\USB\LoadClients\7111_4099\Default\Default\CdcSerial2]
    "Dll"="CDCDRIVER.DLL"
    "Prefix"="COM"
    "Index"=dword:9
    "Order"=dword:0
    "DeviceArrayIndex"=dword:2
    "Irq"=dword:0
    "IoLen"=dword:10

[HKEY_LOCAL_MACHINE\Drivers\USB\LoadClients\7111_4099\Default\Default\CdcSerial2\Unimo
    "Tsp"="Unimodem.dll"
    "DeviceType"=dword:1
    "FriendlyName"="Telit Auxiliary on COM9:"
    "DevConfig"=hex: 10,00, 00,00, 05,00,00,00, 10,01,00,00, 00,4B,00,00, 00,00, 08, 00

[HKEY_LOCAL_MACHINE\Drivers\USB\LoadClients\7111_4099\Default\Default\CdcSerial2\Unimo
    "BaudRate"=dword:1C200
    "EnableFlowHard"=dword:0
    "EnableFlowSoft"=dword:0

[HKEY_LOCAL_MACHINE\Drivers\USB\LoadClients\7111_4099\Default\Default\CdcSerial2\Unimo
     MdmLogFile=0

[HKEY_LOCAL_MACHINE\Drivers\USB\ClientDrivers\CdcSerial2]
    "Prefix"="COM"
    "Dll"="CDCDRIVER.DLL"
```

```
BUILD: [00:0000000093:PROGC ] C/Cpp/Cxx              5             0            0
BUILD: [00:0000000094:PROGC ] Assembler              0             0            0
BUILD: [00:0000000095:PROGC ] Static Libraries       0             0            0
BUILD: [00:0000000096:PROGC ] Dll's                  2             0            0
BUILD: [00:0000000097:PROGC ] Exe's                  0             0            0
BUILD: [00:0000000098:PROGC ] Resx                   0             0            0
BUILD: [00:0000000099:PROGC ] Csharp Targets         0             0            0
BUILD: [00:0000000100:PROGC ] Other                  0             7            0
BUILD: [00:0000000101:PROGC ]
BUILD: [00:0000000102:PROGC ] Total                  7             7            0
BUILD: [00:0000000103:PROGC ]
BUILD: [00:0000000104:PROGC ] 7 Warnings,  0 Errors
Build for Windows CE (Release) (Built on Apr 22 2004 10:38:01)
File names: Build.log Build.wrn Build.err Build.dat

RILTest - 0 error(s), 7 warning(s)
```

- Recreate the OS image.

Now you should have the TELIT MODULE driver integrated into your OS image. Start your system with the just created OS image and, after the boot, plug the device into your target: if the connection succeeds you should see the three virtual serial ports described in paragraph 2.1 ready to be used.

3. Using the HE TELIT MODULE

In this chapter it is explained how to programmatically use the TELIT MODULE (via the serial port API) and how to setup a PPP connection.

3.1. The serial API

Application can interact with the TELIT MODULE through the virtual serial ports created by the driver (for example COM6). Windows CE 5.0 has a complete API for dealing with serial ports; following you can find all the most important calls with code examples. Further information can be found in Microsoft Developer Network.

3.1.1. CreateFile

This function creates, opens, or truncates a file, COM port, device, service, or console. It returns a handle to access the object.

Header:

winbase.h

Library:

coredll.lib

Syntax:

```
HANDLE CreateFile(
  LPCTSTR lpFileName,
  DWORD dwDesiredAccess,
  DWORD dwShareMode,
  LPSECURITY_ATTRIBUTES lpSecurityAttributes,
  DWORD dwCreationDisposition,
  DWORD dwFlagsAndAttributes,
  HANDLE hTemplateFile
);
```

Parameters:

lpFileName

[in] Pointer to a null-terminated string that specifies the name of the object, such as file, COM port, disk device, or console, to create or open.

dwDesiredAccess

[in] Type of access to the object. An application can obtain read-only access, write-only access, read/write access, or device-query access.

dwShareMode

[in] Share mode for the object. If this parameter is set to zero, the object cannot be shared. Subsequent open operations on the object fail until the handle is closed.

This parameter can be set to one or more values.

lpSecurityAttributes

[in] Not used.

dwCreationDisposition

[in] Action to take on files that exist, and which action to take when files do not exist.

dwFlagsAndAttributes

[in] File attributes and flags for the file.

hTemplateFile

[in] Ignored; as a result, this function does not copy the extended attributes to the new file.

Return Value:

An open handle to the specified file indicates success. If the specified file exists before the function call and dwCreationDisposition is set to CREATE_ALWAYS or

OPEN_ALWAYS, a call to GetLastError returns ERROR_ALREADY_EXISTS, even though the function has succeeded. If the file does not exist before the call, GetLastError returns zero. INVALID_HANDLE_VALUE indicates failure. To get extended error information, call GetLastError.

Example:

```
HANDLE hModem;
hModem = CreateFile( TEXT("COM6:"),
                    GENERIC_READ | GENERIC_WRITE,
                    0,
                    NULL,
                    OPEN_EXISTING,
                    0,
                    NULL);
if (hModem == INVALID_HANDLE_VALUE)
   // error opening port; abort
```

Further information on the parameters' values can be found at http://msdn.microsoft.com/en-us/library/aa914735.aspx.

3.1.2. WriteFile

This function writes data to a file. WriteFile starts writing data to the file at the position indicated by the file pointer.

Header:

winbase.h

Library:

coredll.lib

Syntax:

```
BOOL WriteFile(
  HANDLE hFile,
  LPCVOID lpBuffer,
  DWORD nNumberOfBytesToWrite,
  LPDWORD lpNumberOfBytesWritten,
  LPOVERLAPPED lpOverlapped
);
```

Parameters:

hFile
[in] Handle to the file to be written to (returned by CreateFile). The file handle must have been created with GENERIC_WRITE access to the file.

lpBuffer
[in] Pointer to the buffer containing the data to write to the file.

nNumberOfBytesToWrite
[in] Number of bytes to write to the file.

lpNumberOfBytesWritten
[out] Pointer to the number of bytes written by this function call. **WriteFile** sets this value to zero before taking action or checking errors.

lpOverlapped
[in] Unsupported; set to NULL.

Return Value:

Nonzero indicates success. Zero indicates failure.

Example:

```
#define BYTES_TO_BE_WRITTEN 4
char atTest[]="AT\r\n";
DWORD written;
HANDLE hModem;
hModem = CreateFile( TEXT("COM6:"),
                    GENERIC_READ | GENERIC_WRITE,
                    0,
                    NULL,
                    OPEN_EXISTING,
                    0,
                    NULL);
if (hModem == INVALID_HANDLE_VALUE)
   // error opening port; abort
```

```
if (!WriteFile(hModem, atTest, BYTES_TO_BE_WRITTEN, &written,
NULL))
   // error writing bytes; abort
```

Further information on the parameters' values can be found at http://msdn.microsoft.com/en-us/library/ms892380.aspx.

3.1.3. ReadFile

This function reads data from a file, starting at the position indicated by the file pointer.

Header:

winbase.h

Library:

coredll.lib

Syntax:

```
BOOL ReadFile(
  HANDLE hFile,
  LPVOID lpBuffer,
  DWORD nNumberOfBytesToRead,
  LPDWORD lpNumberOfBytesRead,
  LPOVERLAPPED lpOverlapped
);
```

Parameters:

hFile
[in] Handle to the file to be read. The file handle must have been created with GENERIC_READ access to the file. This parameter cannot be a socket handle.

lpBuffer
[out] Pointer to the buffer that receives the data read from the file.

nNumberOfBytesToRead
[in] Number of bytes to be read from the file.

lpNumberOfBytesRead

[out] Pointer to the number of bytes read. **ReadFile** sets this value to zero before doing taking action or checking errors.

lpOverlapped
[in] Unsupported; set to NULL.

Return Value:

Nonzero indicates success. Zero indicates failure.

Example:

```
#define BYTES_TO_BE_WRITTEN 4
#define BYTES_TO_BE_READ 9
char atTest[]="AT\r\n";
char atAnswer[10];
DWORD written;
DWORD read;
HANDLE hModem;
hModem = CreateFile( TEXT("COM6:"),
                    GENERIC_READ | GENERIC_WRITE,
                    0,
                    NULL,
                    OPEN_EXISTING,
                    0,
                    NULL);
if (hModem == INVALID_HANDLE_VALUE)
   // error opening port; abort
if (!WriteFile(hModem, atTest, BYTES_TO_BE_WRITTEN, &written,
NULL))
   // error writing bytes; abort
Sleep(500);
if (!ReadFile(hModem, atAnswer, BYTES_TO_BE_READ, &read, NULL))
   // error reading bytes; abort
```

Further information on the parameters' values can be found at http://msdn.microsoft.com/en-us/library/ms891445.aspx.

3.1.4. CloseHandle

This function closes an open object handle.

Header:

winbase.h

Library:

coredll.lib

Syntax:

```
BOOL CloseHandle(
  HANDLE hObject
);
```

Parameters:

hObject
[in] Handle to an open object.

Return value:

Nonzero indicates success. Zero indicates failure.

Example:

```
HANDLE hModem;
hModem = CreateFile( TEXT("COM6:"),
                    GENERIC_READ | GENERIC_WRITE,
                    0,
                    NULL,
                    OPEN_EXISTING,
                    0,
                    NULL);
if (hModem == INVALID_HANDLE_VALUE)
   // error opening port; abort
CloseHandle(hModem);
```

Further information can be found at http://msdn.microsoft.com/en-us/library/ms923946.aspx.

3.2. PPP Connection

There are several ways to setup a PPP connection for a Windows CE system; in this guide it is described one of the possible methods suitable for headless devices. For further instructions on how to create a subproject refer to MSDN (http://msdn.microsoft.com/en-us/library/aa913961.aspx).

- Open the Platform Builder and load your Os Image Design solution.
- In the solution explorer create a Windows CE Console Application subproject with the source files provided by Microsoft in the directory, starting from your Windows CE root (typically `WINCE600`), `\PUBLIC\COMMON\OAK\DRIVERS\NETSAMP\RASENTRY`, compile it and add to the OS image. This program adds an entry to the default RAS phonebook from information stored in a configuration file.
- Create the RAS phonebook configuration file (for example called telitHE863.ras). In the directory, starting from your Windows CE root (typically `WINCE600`), `\PUBLIC\COMMON\OAK\DRIVERS\NETSAMP\RASENTRY`, there is the file *rasentry.txt* that explains the rules for creating this kind of file. Following there is an example:

```
Name=Telit RAS
UseCountryAndAreaCodes=N
Phone=[Your provider phone number]
SpecificIpAddr=N
SpecificNameServers=N
DeviceType=modem
DeviceName=Telit HSDPA Modem on COM6:
SwCompression=N
IpHeaderCompression=N
DialModifier=[Custom AT commands if needed]
SpecificNameServers=Y
DnsAddr=[Your provider primary DNS address]
AltDnsAddr=[Your provider alternative DNS address]
```

- Create a Windows CE Console Application subproject with the source files provided by Microsoft in the directory, starting from your Windows CE root

(typically `WINCE600`), `\PUBLIC\COMMON\OAK\DRIVERS\NETSAMP\RASDIAL` compile it and add to the OS image. This program setups the PPP connection according to the selected RAS phonebook entry.

- Start your target and, after the boot, plug the HE. Upload the created RAS phonebook configuration file to the target (for example using the File Viewer tool that you can find in the menu *Target→ Remote Tools→ File Viewer*).
- Launch in the target the application *RASENTRY* with the path of the RAS phonebook configuration file as the first argument; you can run an application in your system by choosing the menu voice *Target→ Run Programs* and selecting the desired application.
- Launch in the target the application *RASDIAL* with the name of the created RAS phonebook entry (Telit RAS in the above example) as the first argument.

If all is successful the PPP connection should be setup: you can launch the *ipconfig* application for checking the target ip address.