![Telit wireless solutions logo]

QC Windows CE 6.0 USB Driver User Guide

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Applicable Products

Product
UC864-E
UC864-E-DUAL
UC864-E-AUTO
UC864-G
UC864-K
UC864-WD
UC864-WDU
CC864-DUAL
CC864-SINGLE
DE910-DUAL
CE910-DUAL
HE920

Contents

1.   Introduction

1.1.   Scope

This user guide serves the following purpose:

- Provides details about the CC864, UC864, DE910, CE910 and HE920 Telit Modules.
- Describes how to compile, include in a kernel image and use the Telit CDC-Serial Windows CE 6.0 driver for a headless system.

1.2.   Audience

This User Guide is intended for software developers who develop applications using CC864, UC864, DE910, CE910, HE920 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

UC864 module contain a fully featured HSDPA modem and UMTS/GSM/GPRS module, compatible with the other Telit GSM/GPRS modules.

CC864 modules contain a fully features CDMA modem compatible with the other Telit GSM/GPRS modules.

The DE910-DUAL module is a dual band 1xEV-DO Rev. A 3G wireless module supporting downlink data rates up to 3.1 Mbps and uplink data rates up to 1.8 Mbps. It is pin-to-pin compatible with HE910 HSPA modem.

The CE910-DUAL is a dual band 1x RTT wireless module supporting up/down link data rates up to 153.6kbps. It is designed to have the same form factor of its GSM/UMTS/HSPA/EVDO counterparts of the xE910family: GE910, HE910 and DE910-DUAL.

The Telit HE920 is a tri-band HSPA module representative of the new Telit Automotive form factor xE920. The HE920 is a 3.5G wireless data module offering HSPA connectivity with download speeds up to 14.4 Mbps, upload speeds up to 5.76 Mbps and manufactured under ISO TS16949.

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 USB driver in a Windows CE 6.0 image.
- "Chapter 3, Device Driver" describes how to use the USB driver for interacting with the 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	2009-04-10	First Release
ISSUE #1	2009-10-08	Added support of all UC864 and CC864-DUAL Telit Modules
ISSUE #2	2010-07-14	Updated Applicability Table
ISSUE #3	2011-02-24	Update User bin guide
ISSUE #4	2011-03-05	Added support for DE910 Telit Module
ISSUE #5	2012-06-12	Added support for CE910 Telit Module
ISSUE #6	2013-03-01	Added support for HE920 Telit Module

2. System setup

In this chapter it is described the general architecture of a Windows CE system with attached a Telit module and how to integrate the module device driver in a Windows CE image. The following table shows the reference platforms which this guide has been tested for:
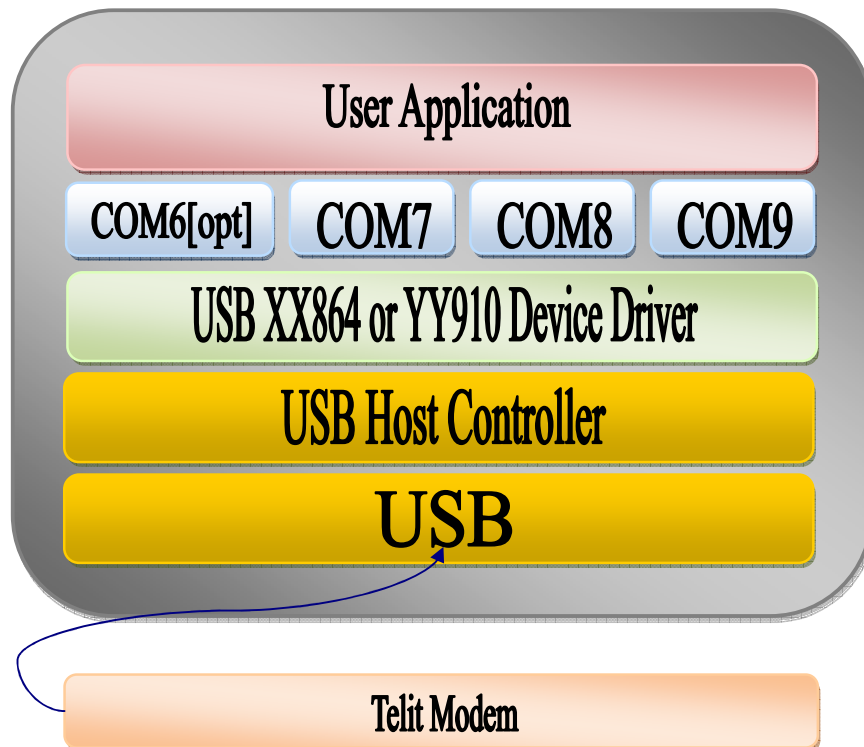
Device	Operating System
AT92SAM9260	Windows CE 6.0 R2

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 Telit module attached:

From the bottom of the stack:

- 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:

  o Detecting the insertion and removal of USB devices
  o Managing flow control between the host and USB devices
  o Managing data flow between the host and USB devices
  o Collecting status
  o Providing power to attached USB devices

- USB Device Driver: piece of software that allows the modem 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 module device driver for accessing the modem; they can be used as real physical serial ports.

UC864-E, UC864-E-AUTO, UC864-K, UC864-WD, UC864-WDU, CC864-K:
- o   COM7: Telit HSDPA modem port, used for normal modem/application interaction (e.g. AT commands sending, data connection…).
- o   COM8: Telit Diagnostics, used for firmware update.
- o   COM9: Telit Auxiliary, used for debugging purposes.

UC864-G, CC864-DUAL:
- o   COM6: Telit HSDPA modem port, used for normal modem/application interaction (e.g. AT commands sending, data connection…).
- o   COM7: Telit Diagnostics, used for firmware update.
- o   COM8: Telit NMEA, used for firmware update.
- o   COM9: Telit Auxiliary, used for debugging purposes.

DE910, HE920:
- o   COM6: Telit Diagnostics, used for firmware update.
- o   COM7: Telit NMEA, used for firmware update.
- o   COM8: Telit Auxiliary, used for debugging purposes.
- o   COM9: Telit HSDPA modem port, used for normal modem/application interaction (e.g. AT commands sending, data connection…).

CE910:
- o   COM6: Telit Diagnostics, used for firmware update.
- o   COM7: Telit HSDPA modem port, used for normal modem/application interaction (e.g. AT commands sending, data connection…).

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

2.2.   Pre-requirements

For correctly building a Windows CE 6.0 image with the module USB driver on a
headless system the following pre-requirements need to be satisfied:

-   Microsoft Visual Studio 2005, with Platform Builder for CE 6.0.
-   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:
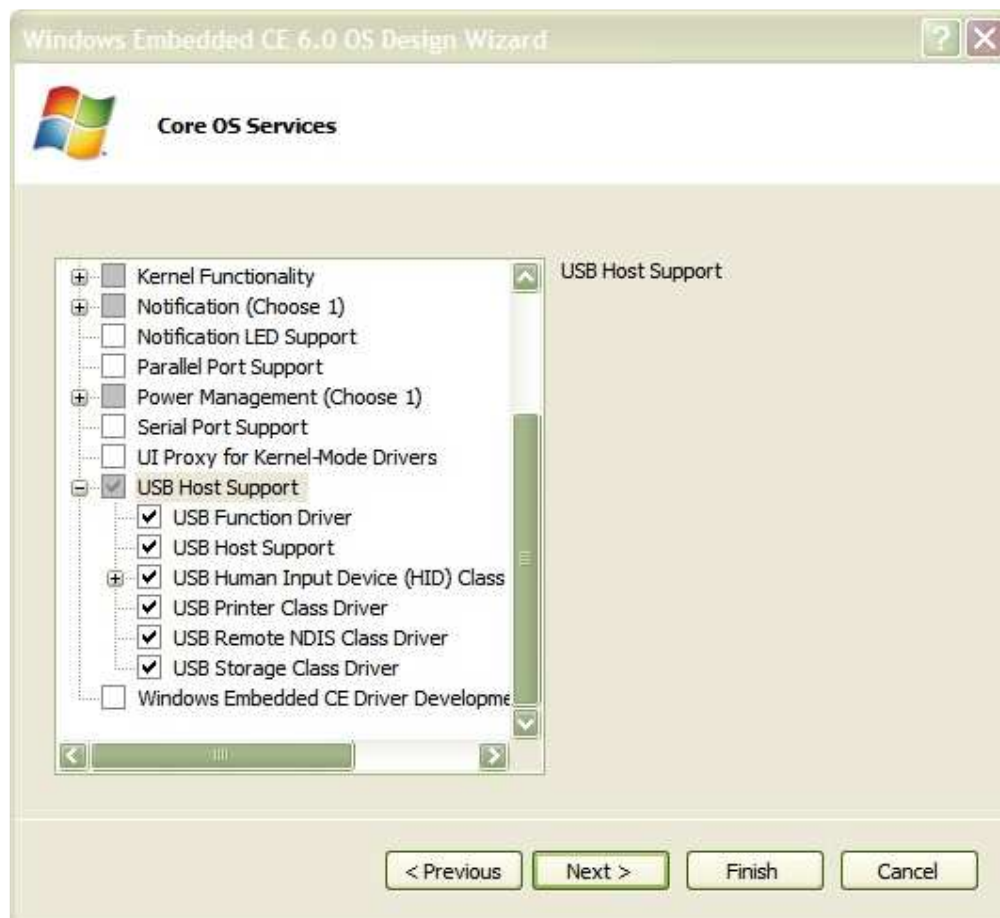
or it can be added using the catalog as the following image suggests:
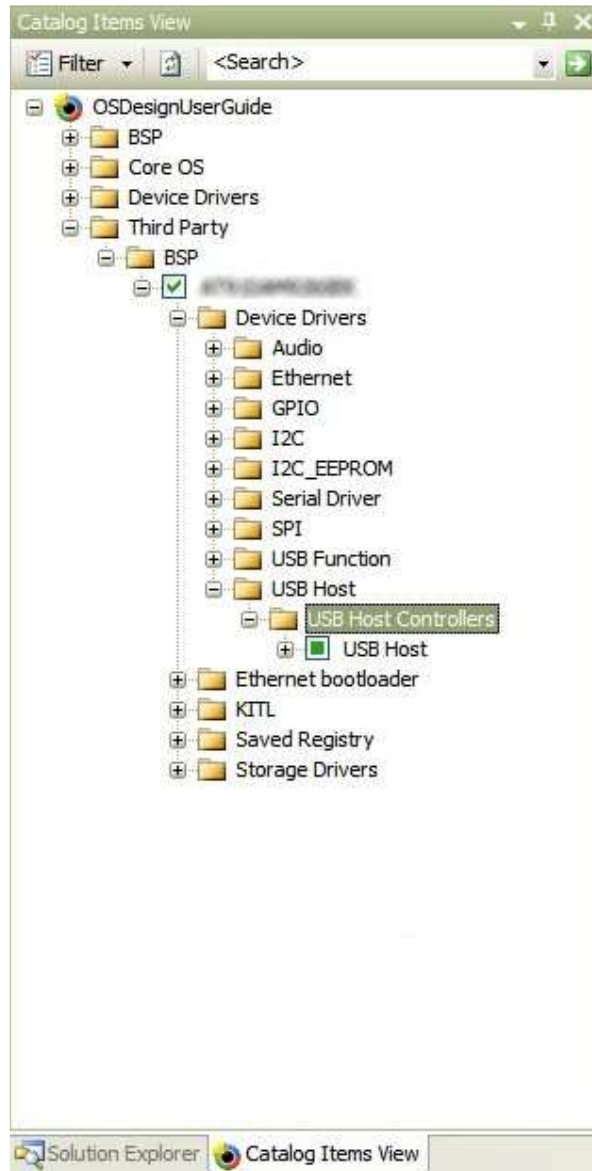
Please note again that this step could be different for your platform.

2.3. Adding modem driver support in the OS image - Using the binary

For adding modem support in the OS image, having the binary *CDCDriver.dll*, follow these steps:

- In the *Solution Explore*, under the folder *Parameter Files* open the folders called as your BSP name and open the file *project.bib*. Under the *Modules* section add the following line:

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

paying attention to change the path to the correct one (the place where the dll can be found).
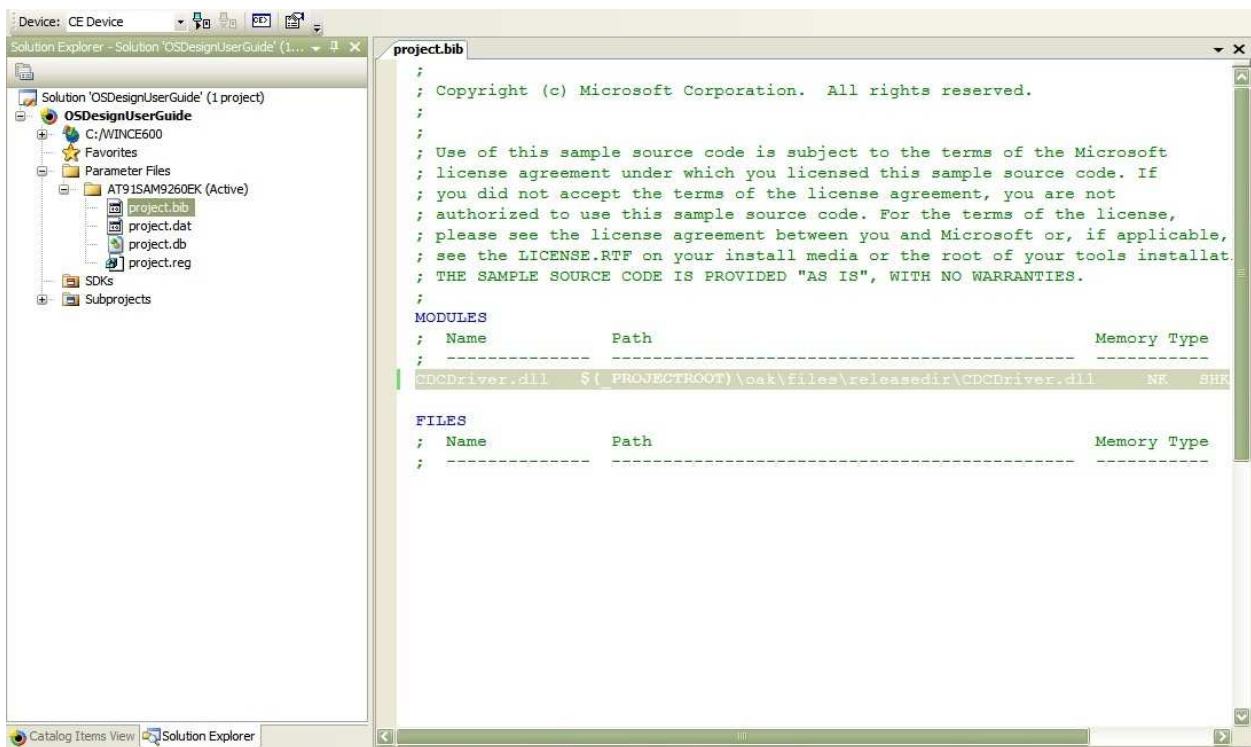
- Open the file *project.reg* and, at its end, paste the content of the file *.reg* according to the following table:

Product	Reg file
UC864-E	CDCDriver_UC864-E.reg
UC864-E-DUAL	CDCDriver_UC864-E.reg
UC864-E-AUTO	CDCDriver_UC864-E.reg
UC864-G	CDCDriver_UC864-G.reg
UC864-K	CDCDriver_UC864-E.reg
UC864-WD	CDCDriver_UC864-E.reg
UC864-WDU	CDCDriver_UC864-E.reg
CC864-DUAL	CDCDriver_CC864-DUAL.reg
CC864-SINGLE	CDCDriver_CC864-SINGLE.reg
DE910-DUAL	CDCDriver_DE910.reg
CE910-DUAL	CDCDriver_CE910.reg
HE920	CDCDriver_HE920.reg

As showed in the next picture:
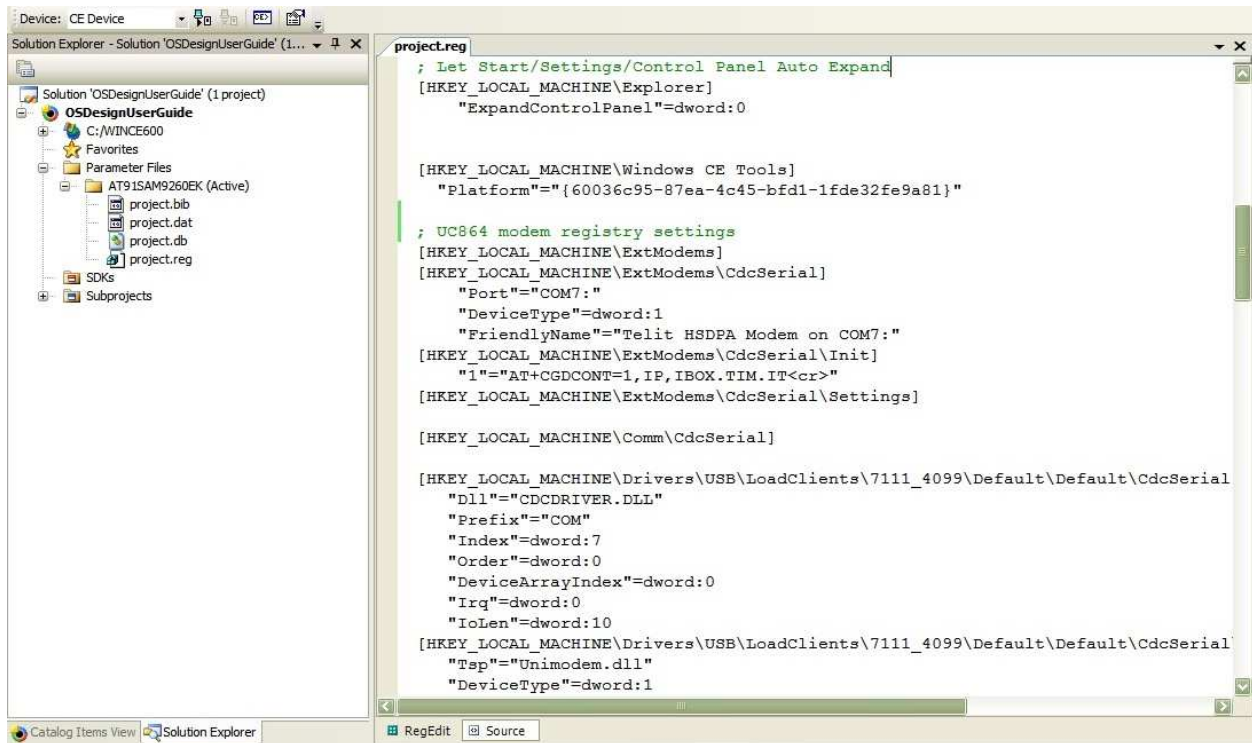
- Recreate the OS image.

Now you should have the 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 or four virtual serial ports described in paragraph 2.1 ready to be used.

3. Using the Telit module

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

3.1. The serial API

Application can interact with the module through the virtual serial ports created by the driver (for example COM7). Windows CE 6.0 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("COM7:"),
                     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("COM7:"),
                     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("COM7:"),
                     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("COM7:"),
                     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 Visual Studio 2005 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 telitUC864.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 COM7:
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 UC864. 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.

3.3. WinCE Limitations

Due to WinCE default configuration, all data or voice connections will be stopped while establishing or disabling a PPP Connection.
In particular when a PPP connection is established while a voice connection is already up, this connection will be interrupted. The same problem occurs when disconnecting a PPP connection during a voice connection.

In order to avoid this effect, it is suggested to add the following registry key in the project registry file:

```
[HKEY_LOCAL_MACHINE\Drivers\Unimodem\Settings]
    "Reset"="AT<cr>"
```