Building Windows Embedded CE 6.0 Headless Image

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This document will show developers to build Windows CE headless image for Vortex86SX/DX devices without display. Programmers can make native programs or console .NET application to run on headless devices. We assume you have Windows CE O/S customize experience to create new O/S design.

Build Environment

Please visit http://www.dmp.com.tw/tech/vortex86dx to download Vortex86DX BSP and install. Read BSP note (ftp://download@ftp.dmp.com.tw/vortex86dx/Vortex86DX_60A_BSP_090324_Note.pdf) to install QFE to fix known bugs in Windows CE.
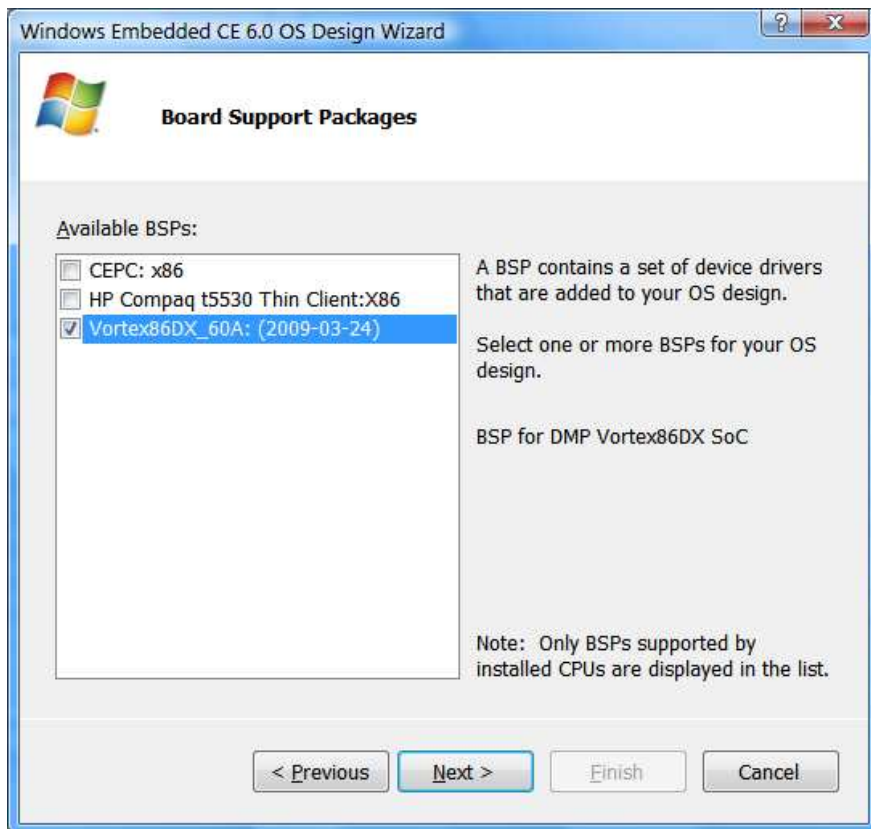
Also read document at ftp://download@ftp.dmp.com.tw/vortex86dx/WinCE_Development_Note.pdf for some development note.

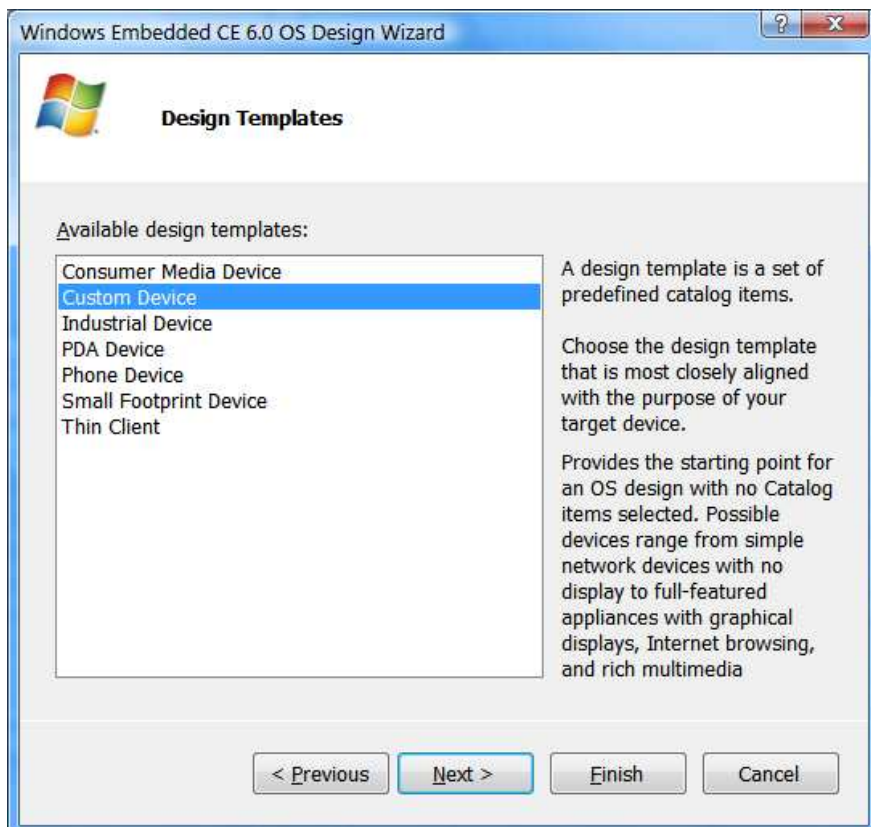## Create a Headless Workspace

Use "VDX_Headless" as project name.
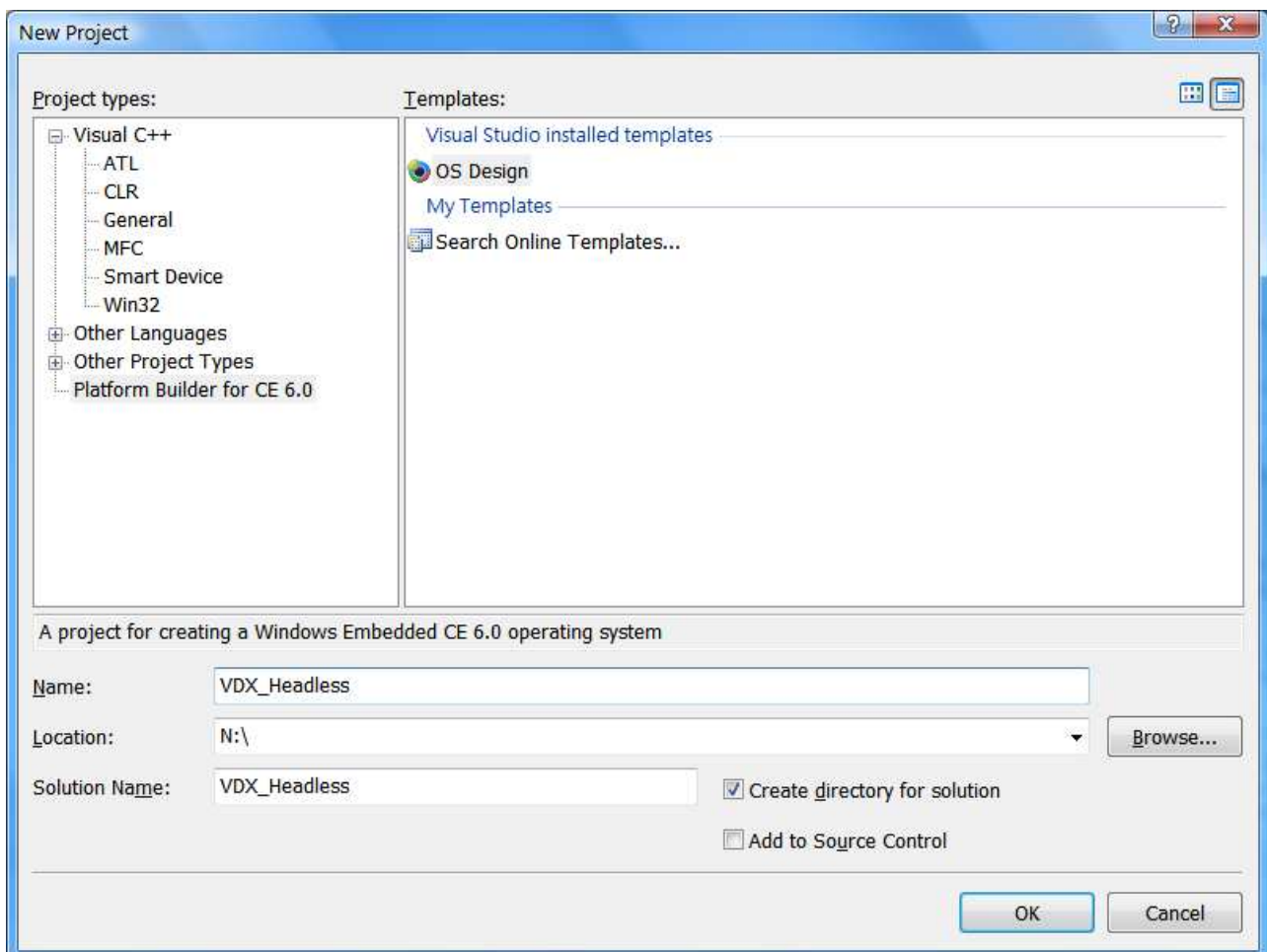
Start new O/S design with Vortex86DX BSP:

Select template "Custom Device" and press finish button to complete wizard. All necessary components will be added manually later.

Add Necessary Components

Here are network components used by our demo:
- Third Party -> BSP-> Vortex86Dx_60A -> RAM Size -> 256MB RAM
- Third Party -> BSP-> Vortex86Dx_60A -> R6040 Ethernet Driver
- Core OS -> CEBASE -> Networking - Local Area Network (LAN) -> Wired Local Area Network (802.3, 802.5).
- Core OS -> CEBASE -> Networking - General -> Windows Networking API/Redirector (SMB/CIFS)
- Core OS -> CEBASE -> Communication Services and Networking -> Servers -> FTP server
- Core OS -> CEBASE -> Communication Services and Networking -> Servers -> Telnet server

For .Net headless application, add this component:
- Core OS -> CEBASE -> Applications and Services Development -> .NET Compact Framework 3.5 -> .NET Compact Framework 3.5 - Headless

If you need USB mass storage and IDE DOM support, add those:
- Core OS -> CEBASE -> Core OS Services -> USB Host Support -> USB Storage Class Driver
- Device Drivers -> Storage Devices -> ATAPI PCI Support

Add Registry Settings

Here are registry settings to use static IP address and enable FTP/Telnet server. Add them onto project.reg:

```
; Static IP address settings
[HKEY_LOCAL_MACHINE\Comm\PCI\R60401\Parms\TcpIp]
  "EnableDHCP"=dword:0
  "DefaultGateway"=multi_sz:"192.168.0.1"
  "UseZeroBroadcast"=dword:0
  "IpAddress"=multi_sz:"192.168.0.232"
  "Subnetmask"=multi_sz:"255.255.255.0"

; Telnet server enable
[HKEY_LOCAL_MACHINE\COMM\TELNETD]
  "IsEnabled"=dword:1
  "UseAuthentication"=dword:0

; FTP server endable
[HKEY_LOCAL_MACHINE\COMM\FTPD]
  "IsEnabled"=dword:1
  "UseAuthentication"=dword:0
  "UserList"="@*;"
  "AllowAnonymous"=dword:1
  "AllowAnonymousUpload"=dword:1
  "AllowAnonymousVroots"=dword:1
  "DefaultDir"="\\"
```

In FTPD registry, we enable anonymous login and the default root path is the whole file system on Windows CE device. For more information about registry settings, please search "FTP server" or "TELNET" in help of Platform Builder.

DHCP is enabled by default for all Windows CE projects in Vortex86DX BSP. Because there is no display on our Windows CE device, it needs some operations to get IP address of CE device. So, we set fixed IP address in this

demo. For most real applications, fixed IP address is used. Add those registry settings into project to disable DHCP and use fixed IP address. The TCP/IP settings in registry are for your reference. Change them according your network environment.

Run Program Automatically

Programmers can make native C program or .Net application running on headless Windows CE image. We are using .Net application in this demo. This .Net demo program will send data to serial port 1000 times. Put .Net demo program "VDX_Headless_Net_Demo.exe" to "**\VDX_Headless\Wince600\Vortex86DX_60A_x86\ OAK\files**" and add those registry settings to run it at boot up: (Search "HKEY_LOCAL_MACHINE\init" in help for more detail)

```
[HKEY_LOCAL_MACHINE\init]
  "Launch40"="VDX_Headless_Net_Demo.exe"
  "Depend40"=hex:14,00
```

Modify project.bib to add this line for Platform Builder to include demo program into Windows CE image:

```
FILES
;  Name                     Path                                              Memory Type
;  ----------------------   ------------------------------------------------  -----------
VDX_Headless_Net_Dome.exe   $(_FLATRELEASEDIR)\VDX_Headless_Net_Demo.exe      NK    S
```
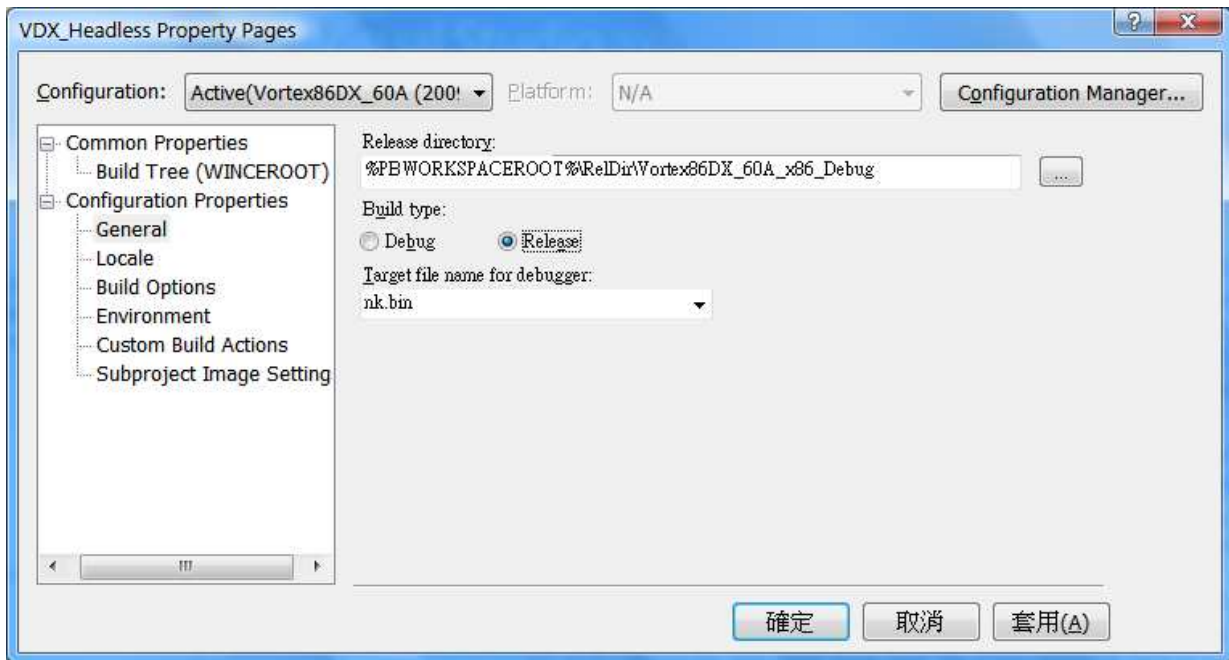
Build Release Image

Developers can build debug image with KITL function to boot CE image via eboot.bin for system debug. After debug is done, build release image to boot from USB pen drive or DOM. Read "Windows CE Development Note" at ftp://download@ftp.dmp.com.tw/vortex86dx/WinCE_Development_Note.pdf for more detail.
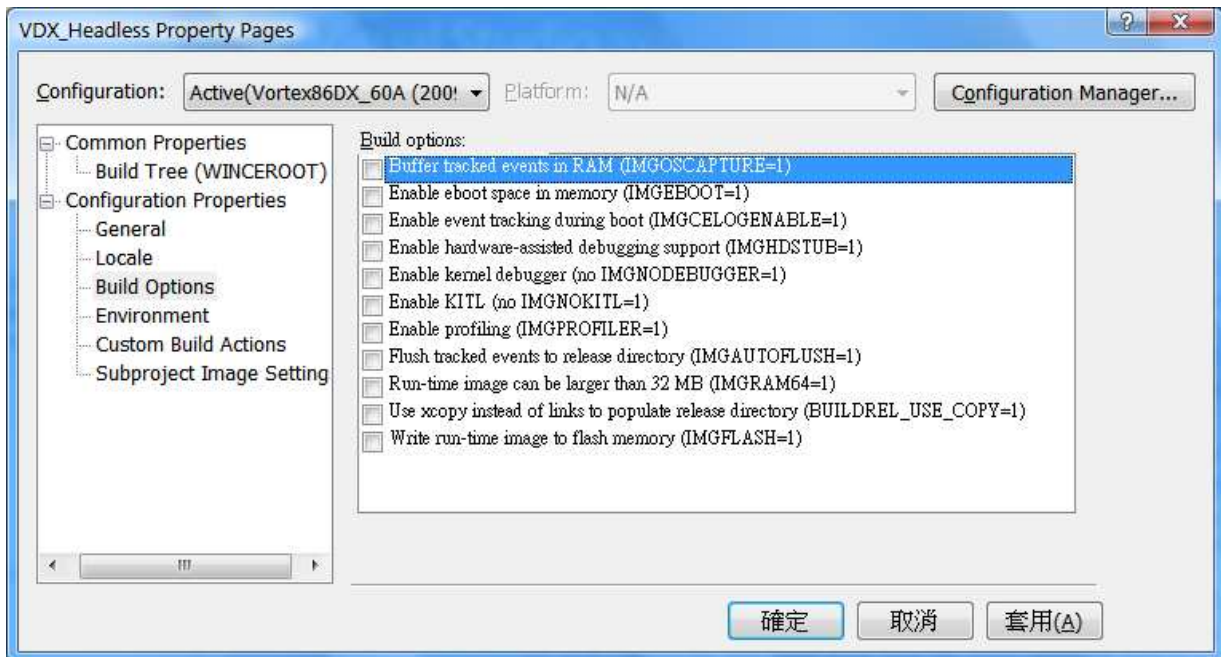
To make release Windows CE image, select "VS2005 -> Build -> Configuration Manager" to enable release mode:
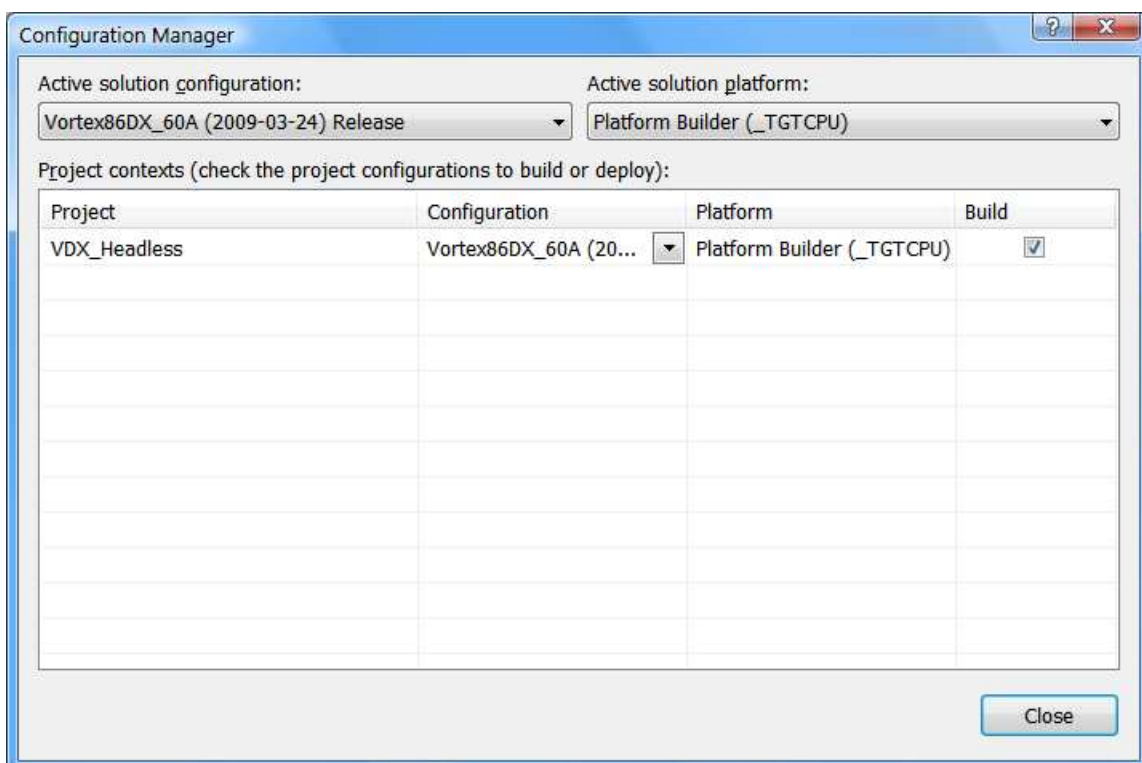
Select "VS2005 -> Project -> VSX_Headless Properties " to select release image as picture:

Uncheck debug options for release mode. Or, uncheck all options is a good solution:

When settings are ready, build new Windows CE image. Boot is from USB or DOM for test in next section.

Test

After Windows CE is loaded, our demo program will run automatically. Check serial port output to ensure demo program is running.
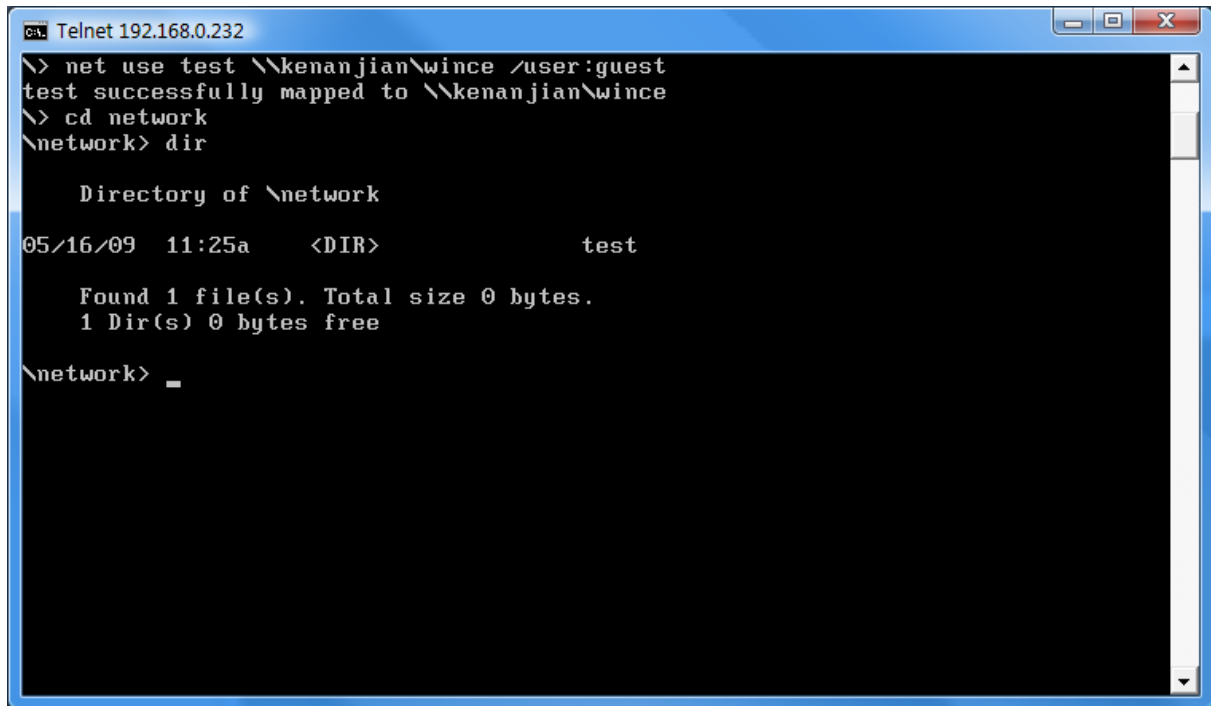
We use FTP client in Windows command prompt to demo. Developers can use their favorite FTP client to do files exchange between Windows CE device and desktop computer. The IP of Windows CE is 192.168.0.232. Use user name "anonymouse" and password "ftp" to login FTP server on Windows CE. Here is the FTP test screen:
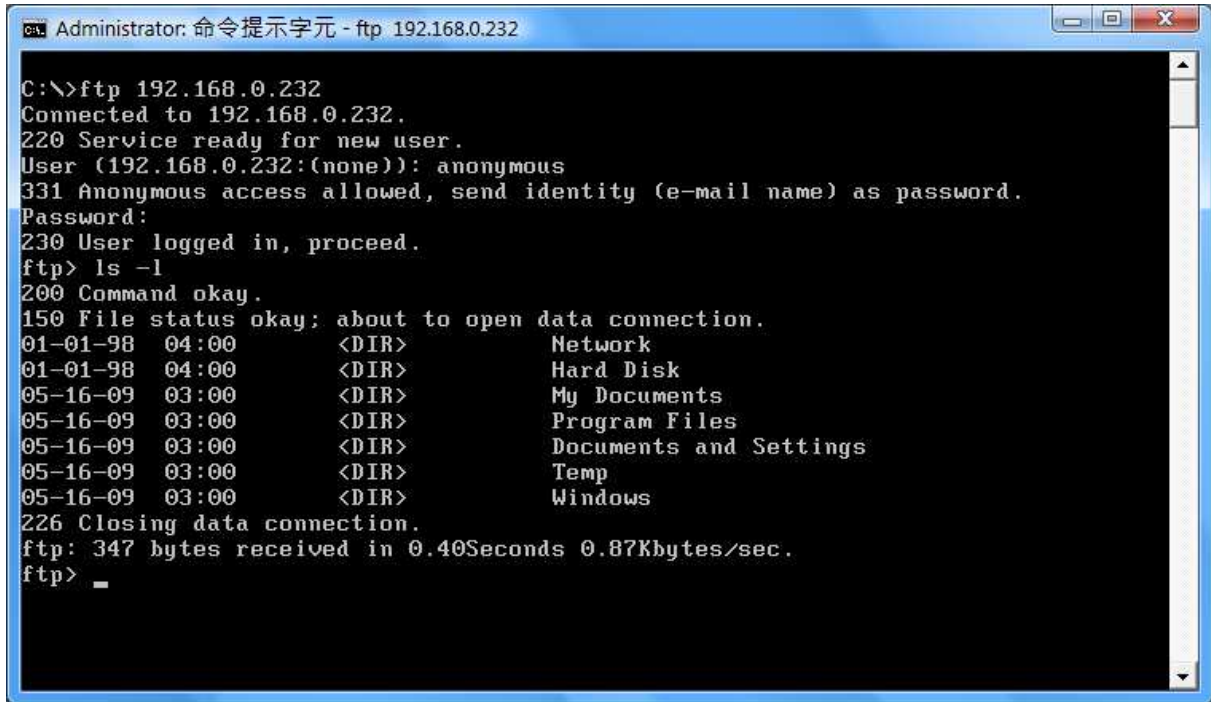
The folder "USB Storage" is USB pen drive and "Hard Disk" is DOM on Vortex86DX board. Below picture is the screen using telnet to connect to Windows CE device:
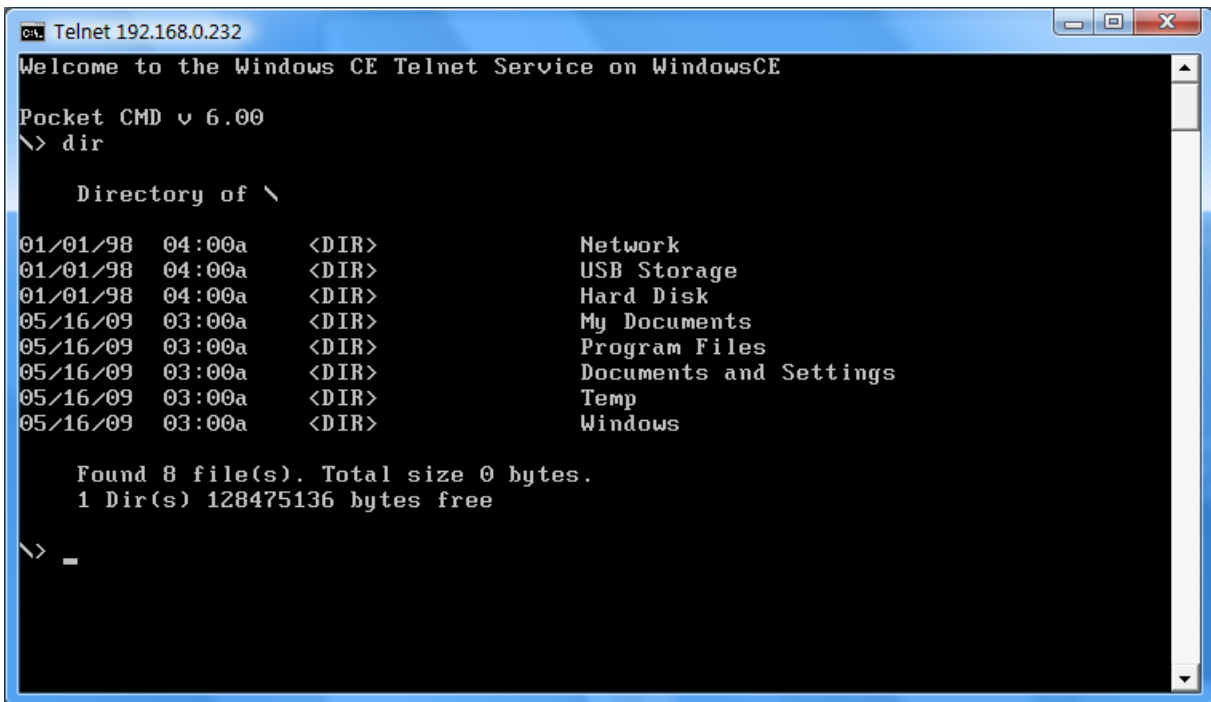
Developers can run program or some jobs via telnet. Net command is used via telnet to map share folder. Run "net" to map share folder on desktop PC to Windows CE device:

Folder "wince" on desktop Windows XP/Vista PC will be mapped to "test" folder in "Network" folder of Windows CE root file system. Just change work directory to "Network" and run dir command, you can find test folder. If full access right is enabled, Windows CE device can read or write files in folder test.

Note:
1.   As our test, only domain name "kenanjian" can work and IP address "192.168.X.X" can not work. Recommend using domain when you test SMB function.
2.   Windows CE device also can be SMB server. Search help of Platform Builder to add registry settings. Here is example to share hard disk for your reference:

```
[HKEY_LOCAL_MACHINE\Services\Smbserver]
  "AdapterList"="*"
  "dll"="smbserver.dll"
  "Keep"=dword:1
  "Order"=dword:9

[HKEY_LOCAL_MACHINE\Services\SMBServer\Shares]
  "UseAuthentication"=dword:0

[HKEY_LOCAL_MACHINE\Services\SMBServer\Shares\HDD]
  "Path"="\\Hard Disk"
  "Type"=dword:0
  "UserList"="@*;"
```

Reference

Visit http://www.dmp.com.tw/tech/vortex86dx for more technical resourece.

Windows CE development note: ftp://download@ftp.dmp.com.tw/vortex86dx/WinCE_Development_Note.pdf.

For more technical support, please visit http://www.dmp.com.tw/tech or mail to tech@dmp.com.tw.