

xPC Target Setup

MTS Systems Corporation
Rev. 29-Jul-08

Obtain Software

Software from The Mathworks (www.mathworks.com) (get the latest versions):

- 1) Matlab
- 2) Signal Processing Toolbox
- 3) Simulink
- 4) Real Time Workshop
- 5) xPC Target

Software from Microsoft:

Either: Microsoft Visual C++ Professional Edition version 8.0
Or: Microsoft Visual C++ 2005 Express Edition version 8.0

Note: Supported compilers change over time. Contact the Mathworks at 508-647-7000 to find out which compiler version is supported for use with the current version of xPC Target. The above compiler is supported for Release 2007b of xPC Target.

The Express Edition is free for download--- see below for installation details.

Software from Curtiss-Wright (www.cwcembedded.com):

Scramnet GT driver

This driver is required only if you have Scramnet GT hardware. If you have Scramnet Plus hardware, the driver is supplied by The Mathworks in its standard xPC Target distribution and it is not necessary to obtain it from Curtiss-Wright.

The driver software is free. Contact Curtiss-Wright at 937-252-5601.

See below for installation instructions.

Install Software

How to Install Microsoft Visual C++ 2005 Express Edition version 8.0:

(Note: Some steps refer to dialog boxes in Microsoft Vista;
will be somewhat different in Windows XP.)

Step 1: Download Microsoft Visual C++ 2005 Express Edition;
make sure to include IDE option.

Step 2: Download Visual C++ 2005 Express SP1.

Step 3: Download Visual Studio 2005 SP1 Update for Vista.

Step 4: Register with Microsoft to get a program key.
Start up MSVC++ and enter the key.

Step 5: Download Microsoft Platform SDK (PSDK-x86.exe)

Step 6: Update the Visual C++ directories in the Projects and Solutions section of MSVC++ in the Options dialog box, by adding the paths below to the appropriate subsection:

Executable files: C:\Program Files\Microsoft Platform SDK for Windows Server 2003 R2\Bin
Include files: C:\Program Files\Microsoft Platform SDK for Windows Server 2003 R2\Include
Library files: C:\Program Files\Microsoft Platform SDK for Windows Server 2003 R2\Lib

Step 7: Download Microsoft Visual C++ 2005 SP1 Redistributable Package (x86) (vcredist_x86.exe).

Note: The Redistributable Package need be installed only on machines that make mex functions, and need not be installed on machines that only run them (this was tested).

Step 8: Set the environment variable
MSSdk
to value
C:\Program Files\Microsoft Platform SDK for Windows Server 2003 R2
as follows:
Go to Control Panel, System, Advanced system settings,
Environment Variables, System Variables, New, and enter the
above information.

How to Install Scramnet GT Driver:

Step 1: Extract the files inside the zipfile "cwcec_scgt_2007b_thirdpartydrivers.zip" (name may vary according to current Matlab version) to the Matlab folder "C:\Program Files\MATLAB\R2007b\toolbox\rtw\targets\xpc\target\build\xpcblocks\thirdpartydrivers". If your software was not installed under "C:\Program Files" then please adjust that portion of the directory name accordingly to match your system.

Step 2: Start Matlab, and type into the command window: rehash toolbox

Step 3: Quit Matlab and restart. The Simulink driver I/O blocks are now accessible in the Simulink Library Browser as "xPC Target: SCRAMNet GT Library".

Configure and Verify the Entire Software Installation

Once you have installed all of the software, you must configure it for use by xPC Target. To see how to do this, start Matlab and enter its Help facility, navigate to "xPC Target, Getting Started, Installation and Configuration", and follow the instructions in the section titled "Installation on the Host PC".

Next, verify the installation by running the xPC Target test suite described in "Testing and Troubleshooting the Installation".

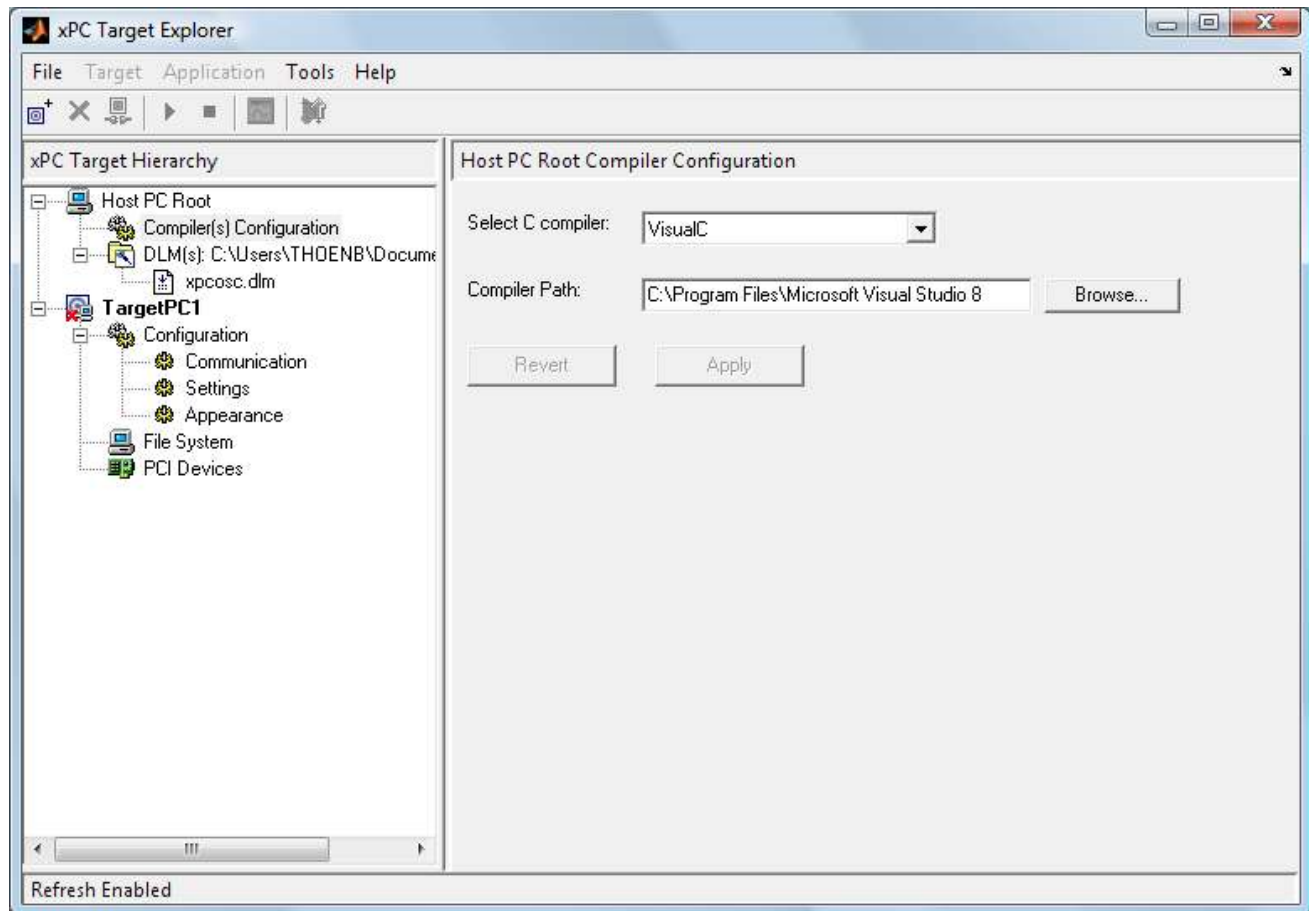
It is very good idea that you read the entire "Getting Started" section in order to familiarize yourself with xPC Target.

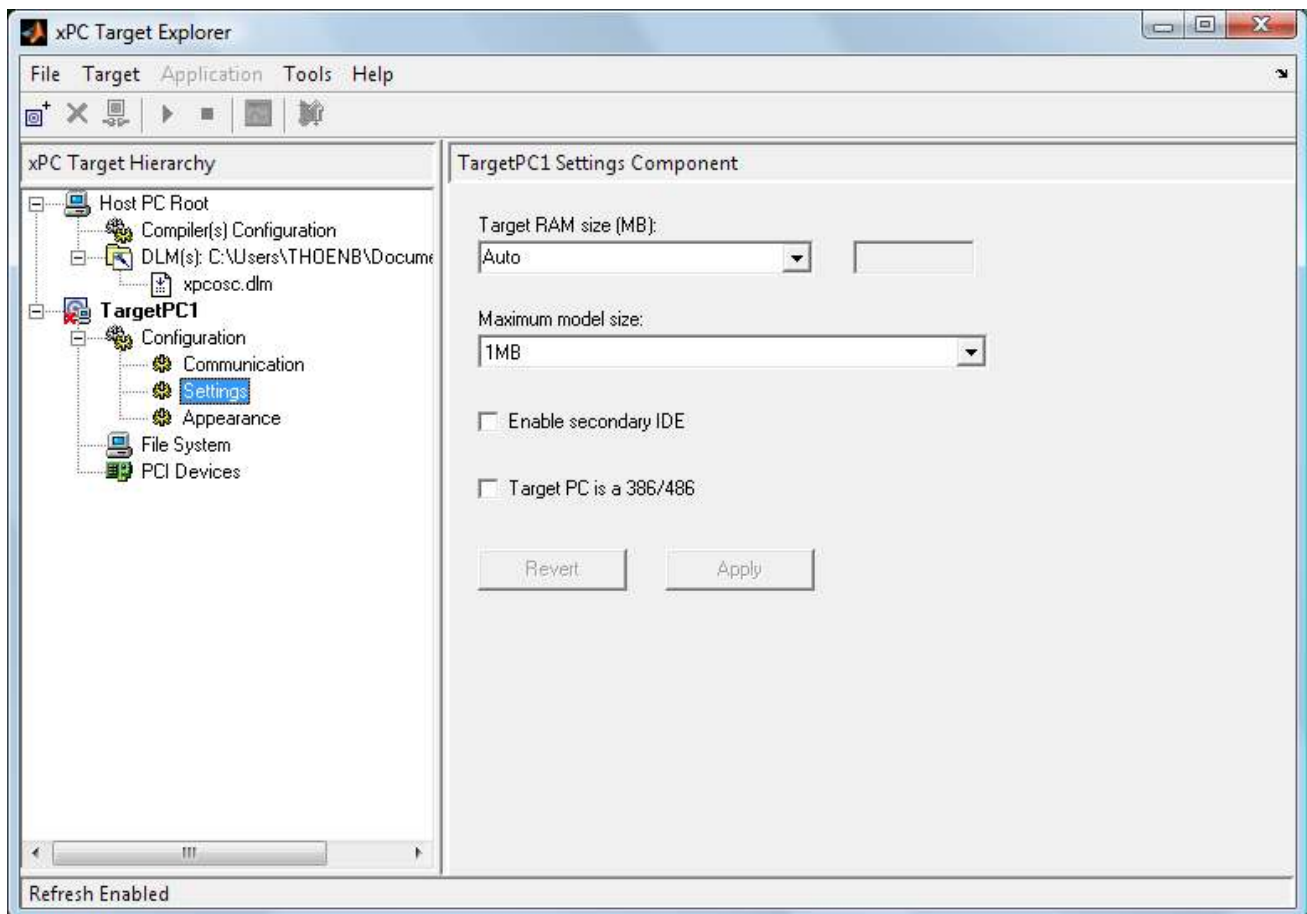
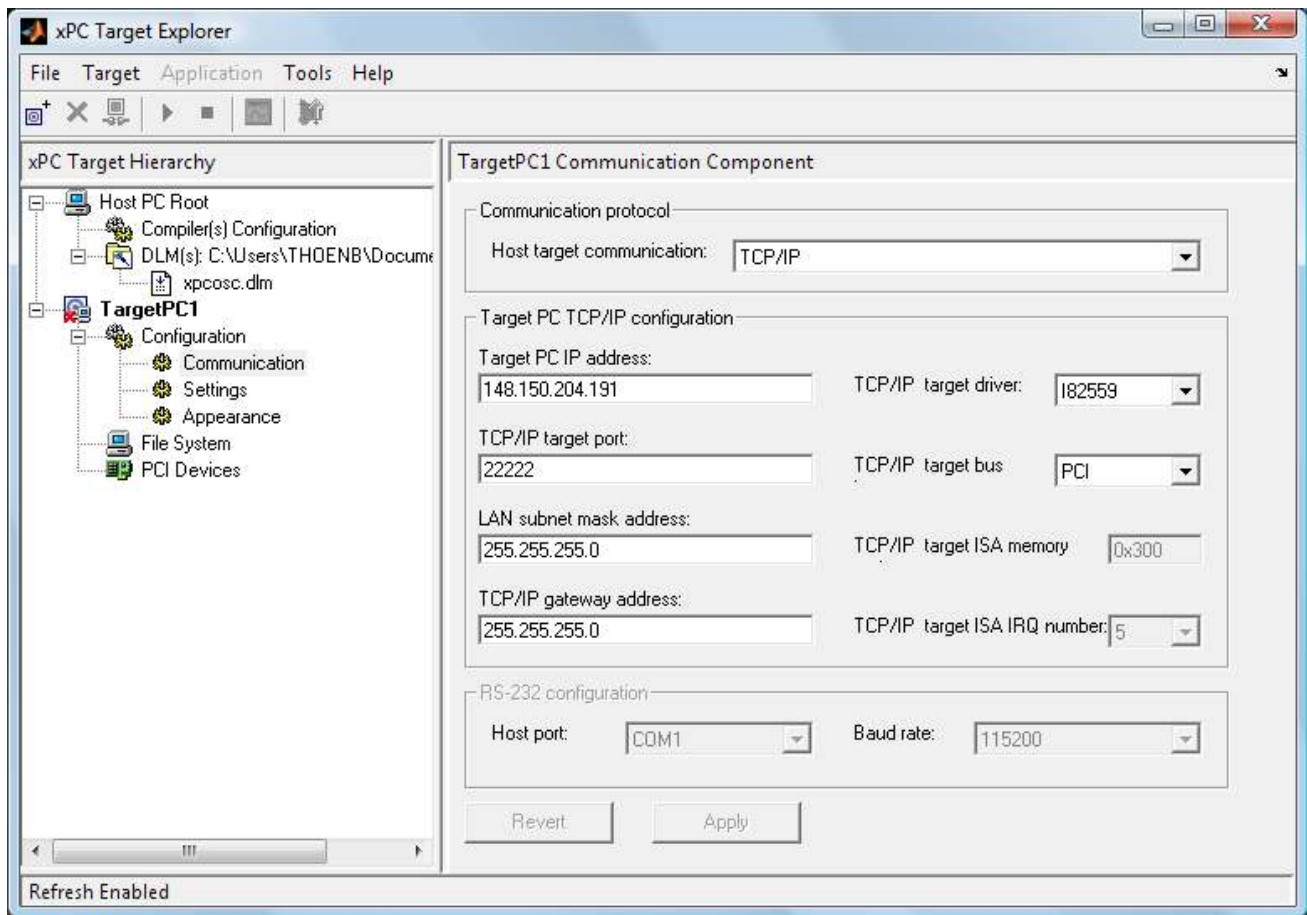
If you have difficulties, contact tech support at The Mathworks at 508-647-7000, option 5.

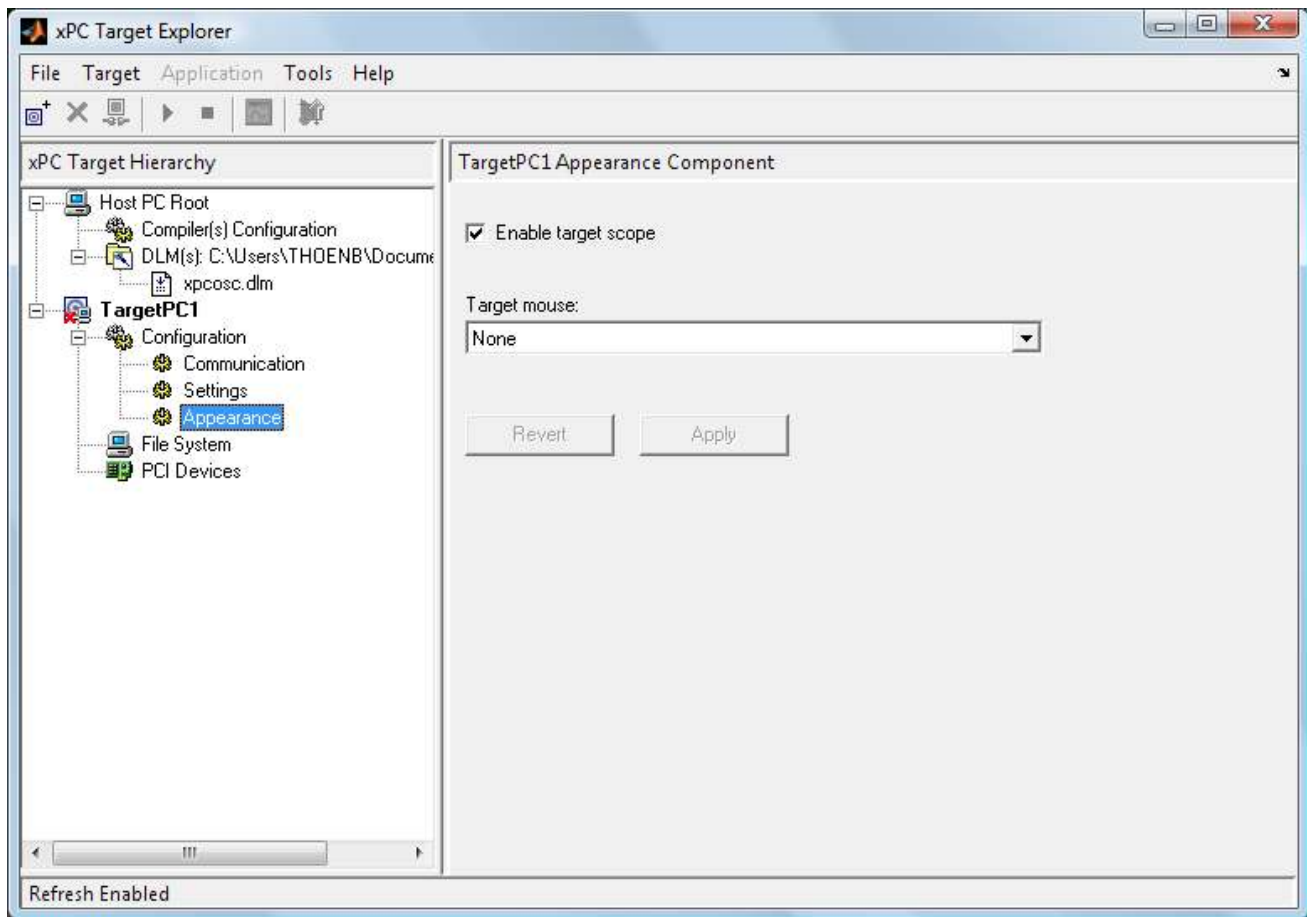
To configure xPC Target, type into the Matlab command window:

```
>> xpcexplr
```

and configure the windows as shown below. Note that specific details for your configuration may be different, for example, you may decide to use a different Target PC IP address.







Configure Scramnet Interrupts

The MTS controller synchronizes the execution of the Simulink model via Scramnet interrupts. To determine which IRQ the Scramnet board uses, type the following into the Matlab command window:

```
>> getxpcpci all
```

A list of all PCI devices will then be printed in the command window. If you have a Scramnet Plus board, something like this will appear:

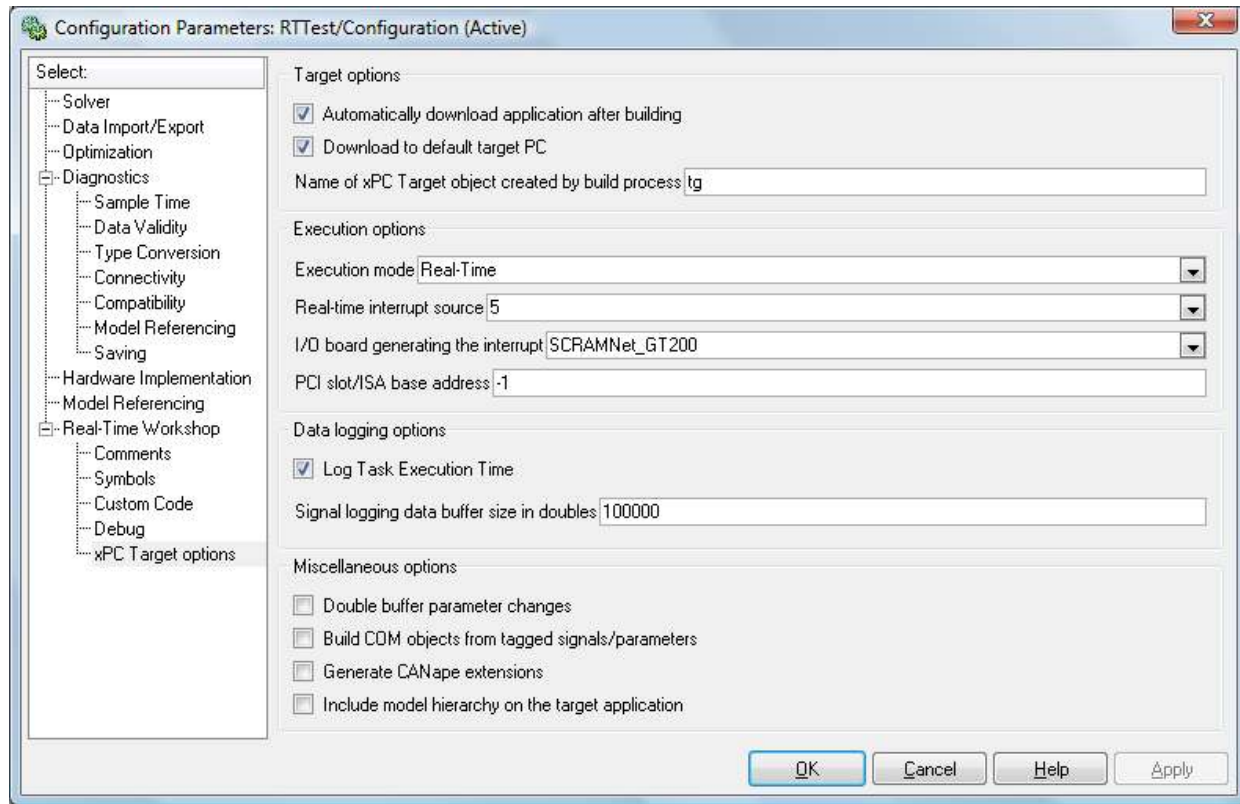
```
Curtiss Wright Controls Embedded Computing SCRAMNet+ SC150e
Bus 12, Slot 2, IRQ 5
Shared memory
VendorID 0x11b0, DeviceID 0x4750, SubVendorID 0x1387, SubDeviceID 0x5301
```

or if you have a Scramnet GT board:

```
Curtiss Wright Controls Embedded Computing SCRAMNet GT
Bus 5, Slot 5, IRQ 5
Shared memory
VendorID 0x1387, DeviceID 0x5310, SubVendorID 0x1387, SubDeviceID 0x5310
```

Note that if you use Windows XP, the first line identifying the board as a Scramnet board may not appear, in which case, look for the appropriate Vendor ID.

The IRQ number must be entered into your model. In your model, call up the Configuration Parameters window from the Simulation menu (shown below), and select the appropriate IRQ number as the “Real-time interrupt source”. Also make to select your particular Scramnet board model in the “I/O board generating the interrupt” popup menu.



Note that if you have problems getting interrupts to work, you can always run off of the internal timer by selecting “Timer” as the “Real-time interrupt source”. You will not be synchronized with the controller, but usually this is not a problem.

Disable System Management Interrupts (SMIs) on the Target Computer (if required)

To successfully operate real-time software on any microprocessor system, control and management of all interrupt services is required. Depending on your BIOS, certain interrupts known as System Management Interrupts (SMIs) can interrupt the processor during the execution of your model. SMIs are used to handle a variety of tasks, such as CPU thermal management or management of the USB ports. In some cases, these SMIs can take a considerable amount of time to process, causing xPC Target to halt the model with a “CPU Overload” fault. These SMIs must be disabled if realtime operation is to be ensured. Unfortunately, disabling SMIs may not be easy. Some SMIs can be disabled by configuring the BIOS during the bootup process. Others may not be accessible from the BIOS, but for some chipsets, such as the Intel ICH5 family, it may be possible to programmatically prevent or disable the generation of SMIs. Contact technical support at The Mathworks (508-647-7000, option 5) for more details.

If your model halts due to a “CPU Overload”, type the following into the Matlab command window to generate a plot of the CPU loading versus time:

```
>> plot(tg.TimeLog, tg.TETLog)
```

If you see a large spike in this graph, it may be due to an SMI.