The Agilent Technologies E2920 PCI/PCI-X Series

Application Note 4

Read and write register values of your device before a driver is available

When designing a device, you may need to read values from (peek) and write values into (poke) its registers or memory before a driver is available. The Agilent PCI/PCI-X Exerciser, a combination of testcard and software, simplifies this task. The testcard makes it possible to peek and poke the registers of the device under test either via an external host or via PCI within the control PC. The | testcard can be easily programmed by entering specific commands in the Command Line Interface of the Agilent's Exerciser GUI.

Aims of this Application Note

To show how to access registers of a device before a driver is available by using the Exerciser's Command Line Interface (CLI).

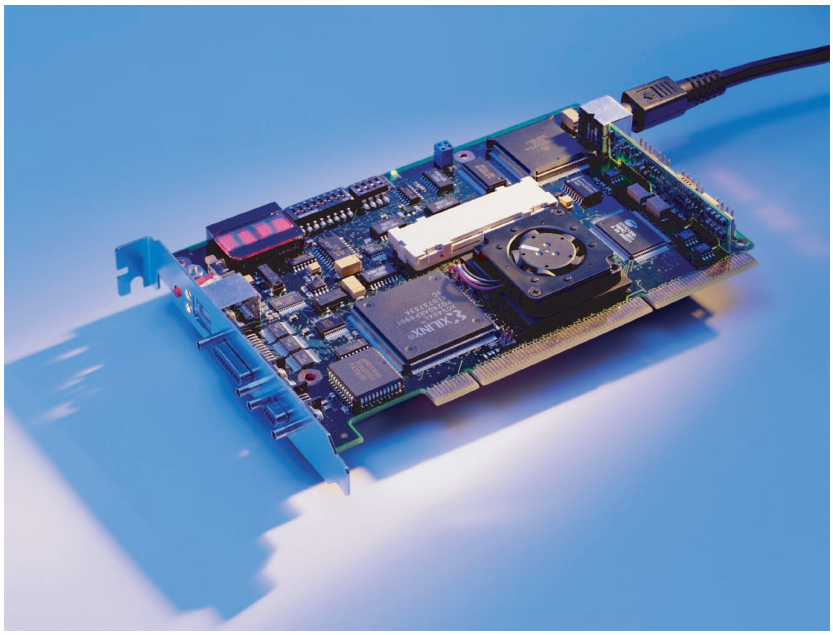
Questions that can be answered with the help of the PCI/PCI-X Exerciser

How can I peek and poke:

•Register values of a PCI device
•Memory spaces of a PCI device
•Register values of a PCI-X device before a driver is available?

Benefits of the Agilent PCI/PCI-X Exerciser

- Allows interactive work, which allows you to immediately see the effects of your changes.



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Setting Up the Test

Plug the testcard into the system under test, and start the Agilent E2920 test software either on an external host or on the control PC.

If the software is running on an external host, connect the control PC via parallel or serial port to the testcard. (The parallel port is used in combination with the Fast Host Interface card plugged into the host PC, see figure below.)

If the software is running on the system under test, the testcard accesses the device under test via the PCI bus (see figure below).

To establish the connection to the testcard:

1. Open the Testcard Configuration dialog box by clicking this item in the Setup menu of the main window.

2. Select the port the testcard is connected to.

To communicate with the testcard, you need to send commands to it that you enter in the CLI. To open the CLI, select Command Line Interface in the Windows menu of the Main Window.

The following figures show the possible test setups.

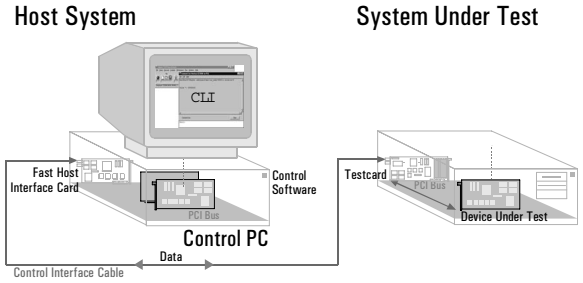

Figure 1.

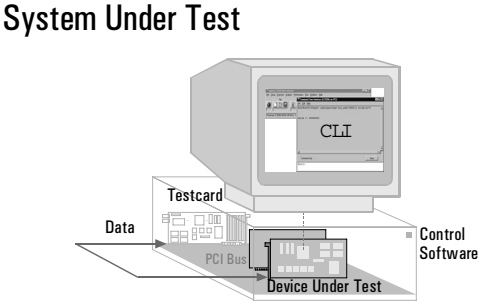

Figure 2.

All commands allow access to the memory, I/O and configuration space of the device under test.

Note
All available commands used to access registers of PCI and PCI-X devices are introduced in the following examples. Note that not all the available parameter settings can be shown here. For further information on these, refer to the Summary of Commands Used at the end of this document.

Peeking and Poking Register Values of a PCI Device

This section shows how to peek and poke register values of a PCI device by means of the following examples:

- Peeking register values from the video frame buffer memory of a VGA graphics adapter
- Poking register values into the video frame buffer memory of a VGA graphics adapter

Peeking Register Values

Task

To peek register values from the video frame buffer memory of a VGA graphics adapter.

Procedure

1. Open the Command Line Interface.
2. Read a dword from the physical memory address 0xb8000 by entering the following command line:

```
BestHostPCIRegGet space=mem Bus_addr=b8000\h size=4
```

Command to get a register value

dword transfer

Figure 3.

Poking Register Values

Task

To poke a character into the top left corner of the VGA text screen (visible in DOS mode only).

Procedure

1. Open the Command Line Interface (CLI).
2. Write a single byte to the physical memory address 0xb8000 by entering the following command line:

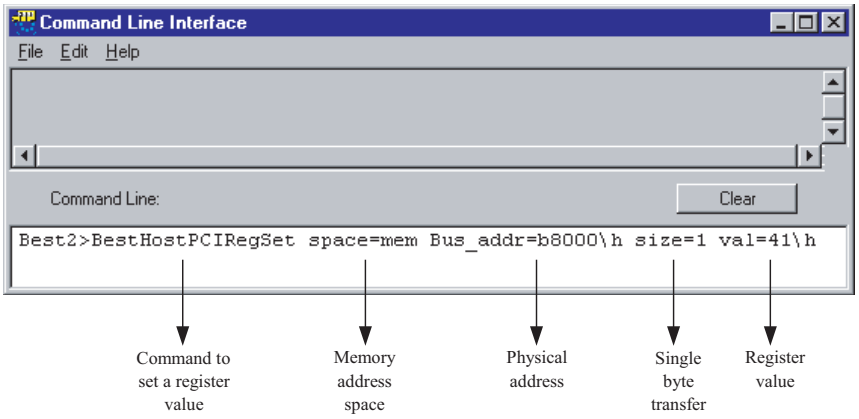

Figure 4.

You can also poke the I/O or configuration space of a device by setting space=io or space=config.
Each successful completion of a command is indicated by Ready displayed in the CLI.

Results

The character 'A' will be displayed in the top left-hand corner of the DOS screen.

Peeking and Poking Memory Spaces of a PCI Device

The PCI/PCI-X Exerciser operates as follows when accessing memory spaces:

Data Transfer to the Device Under Test (Poking)

The Exerciser transfers data from the control PC to the device under test in two steps:

1. It transfers the data into a memory buffer in the testcard.

2. It writes the data from the testcard into the device under test

Data Transfer from the Device Under Test (Peeking)

The Exerciser transfers data from the device under test to the control PC in two steps:

1. It reads the data from the device under test into a memory buffer in the testcard.

2. It transfers the data from the testcard to the control PC.

Because all data transfers require the use of the testcard's data memory, you need to allocate a buffer in this memory before you start the transfer.

The following examples show you how to use Exerciser commands to make data transfers:

- Peeking a data block from the video frame buffer memory of a VGA graphics adapter

- Poking a data block into the video frame buffer memory of a VGA graphics adapter

Peeking Memory Spaces

Task

To read 32 Kbytes from a VGA graphics adapter (PCI address 0xB8000000) to the memory of the control PC.

Procedure

1. Open the CLI.
2. Allocate the required buffer in the testcard's data memory by entering the following command line:

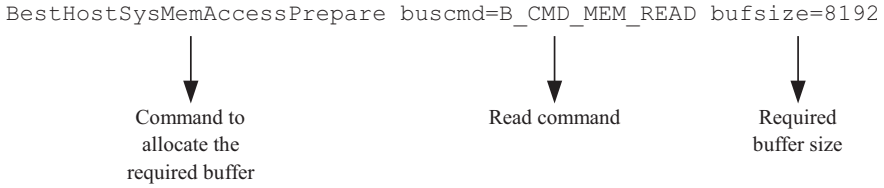

Figure 5.

3. Perform the data transfer by entering the following command line:

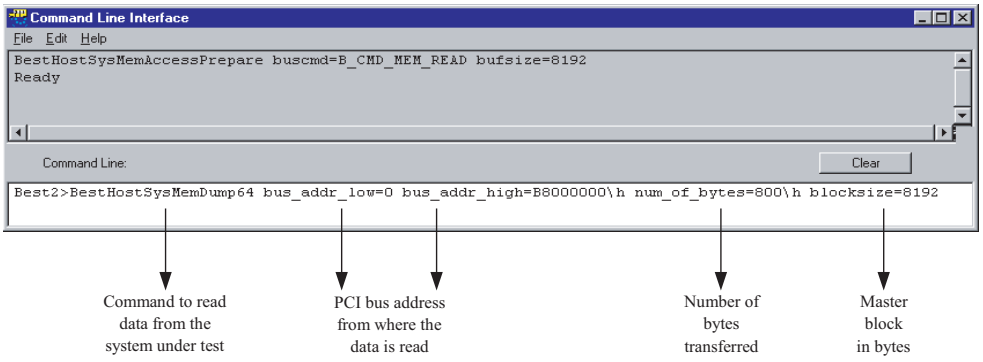

Figure 6.

Results

The CLI displays the value read from the accessed memory space

Poking Memory Spaces

Task

To write the data (1\h, 2\h, 3\h, 4\h, 5\h, 6\h, 7\h, 8\h) to a VGA graphic adapter (PCI address 0xB8000000).

Procedure

1. Open the CLI.
2. Allocate the required buffer in the testcard's data memory by entering the following command line:

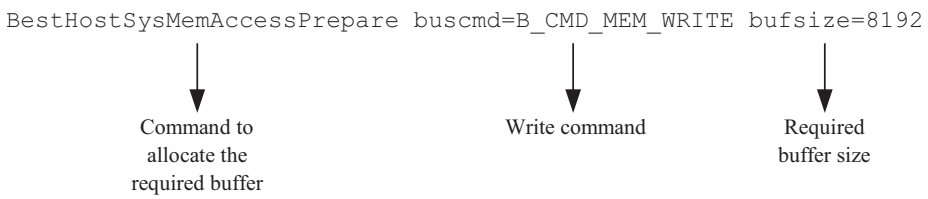

Figure 7b

3. Perform the data transfer by entering the following command line:

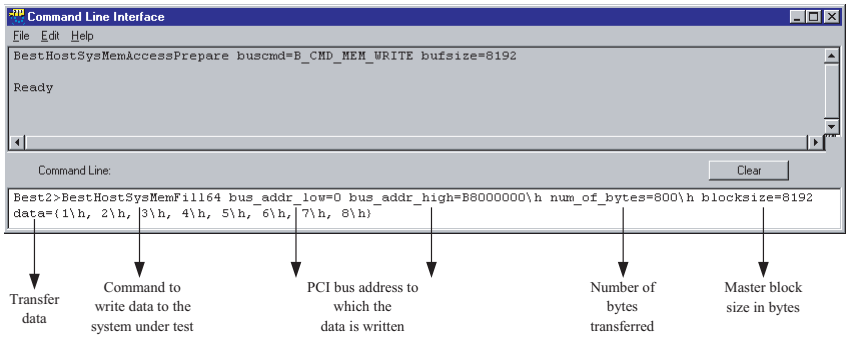

Figure 7c

Peeking and Poking Register Values of a PCI-X Device (valid only with Agilent E2920 PCI-X Card)

The principles used to program data transfers between the Exerciser and a PCI-X device are the same as for PCI devices. The commands provided by the PCI-X Exerciser software to access the registers of a PCI-X device are introduced in the following examples.

Peeking Register Values Task

To transfer a dword from a register in a PCI-X device at the physical memory address 0x8000 to the control PC.

Procedure

1. Open the Command Line Interface.
2. Read the register dat by entering the following command line:

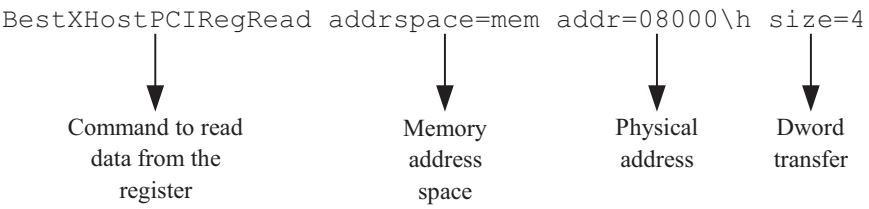

Figure 8.

Results

The register value is displayed in the Command Line Interface.

Poking Register Values Task

To transfer a dword from the control PC to a register at the physical memory address 0x8000 of a PCI-X device.

Procedure

1. Open the CLI.
2. Write the value to the register by entering the following command line

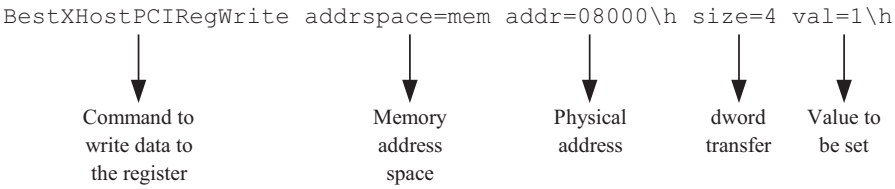

Figure7

Results

The value is written to the PCI-X device register.

Summary of Commands Used

Commands for PCI

BestHostPCIRegGet / BestHostPCIRegSet

Description Reads/writes the value from/to a specific PCI device register in a 32-bit address space—the type address space determines the configuration, memory or I/O read.

Syntax
BestHostPCIRegGet space=<addrspace> bus_addr=<bus_addr> size=<size>
BestHostPCIRegSet space=<addrspace> bus_addr=<bus_addr> size=<size> val=<reg_value>

Parameters

addrspace:	mem	(Memory Space)
	io	(IO Space)
	config	(Type 0 access to Config Space)
	config_type	(Type 1 access to Config Space)
bus_addr:	PCI bus address	
size:	1	(byte)
	2	(word)
	4	(Dword)
reg_val:	Register Value	

BestHostSysMemAccessPrepare

Description Prepares the internal address, the command in the master block properties, and a memo buffer for a transfer through the data memory of the testcard. Data verification can be activated.

Syntax BestHostSysMemAccessPrepare buscmd=<buscmd> bufsize=<bufsize>

Parameters

buscmd:	B_CMD_MEM_WRITE	(memory write)
	B_CMD_MEM_READ	(memory read)
bufsize:	internal memory buffer size in dwords (minimum: 2 dwords)	

BestHostSysMemDump64/BestHostSysMemFill64

Description Transfers data from a PCI device to the host system memory./
Transfers data from the host system memory to a PCI device.

Syntax

BestHostSysMemDump64	bus_addr_low=<bus_addr_low> bus_addr_high=<bus_addr_high> num_of_bytes=<num_of_bytes> blocksize=<blocksize> [data>"file path"]
BestHostSysMemFill64	bus_addr_low=<bus_addr_low> bus_addr_high=<bus_addr_high> num_of_bytes=<num_of_bytes> blocksize=<blocksize> (data=<{data_list}>) | (data<"file path")

Parameters

bus_addr_low/ bus_addr_high:	PCI bus address
num_of_bytes:	Number of bytes to be transferred (maximum of 128 Kbytes).
blocksize:	Size of the master block transfers in bytes.
data_list:	List of data to be transferred.
data<"file path" (optional):	File to which the data can be exported.

Commands for PCI-X

BestXHostPCIRegRead / BestXHostPCIRegWrite

Description Reads/writes the value from/to a specific PCI-X device register in a 32-bit address space—the type of address space determines the Configuration, Memory or I/O Read.

Syntax

BestXHostPCIRegRead	space=<addrspace> bus_addr=<bus_addr> size=<size>
BestXHostPCIRegWrite	space=<addrspace> bus_addr=<bus_addr> size=<size> val=<reg_value>

Parameters

addrspace:	mem	(Memory Space)
	io	(IO Space)
	config	(Access to Config Space)
bus_addr:	PCI bus address	
size:	(byte)	1
	(word)	2
	(Dword)	4
reg_val:	Register Value	Register Value

Glossary

Control PC This PC runs the software that controls the testcard.

Data Memory The data memory holds received test data, and data to be transferred by the testcard. It is shared between the master and the target and can be set up or read out with host access functions. It also provides a data compare unit to compare incoming data with previously stored reference data.

Exerciser (PCI) The PCI Exerciser functions enable the testcard to emulate a PCI master or target.

Exerciser (PCI-X) The PCI-X Exerciser functions enable the testcard to emulate a PCI-X requester-initiator, completer-target, completer-initiator or requester-target:

Host Same as Control PC.

Peeking Reading values from device registers or memory spaces.

Poking Writing values into specific device registers or memory spaces.

System Under Test The system under test is the PCI/PCI-X system into which the testcard is plugged.

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Related Agilent Literature

- Agilent E2925B 32bit, 33 MHz, Agilent E2926B 32/64bit, 33 MHz PCI Exerciser & Analyzer, technical specifications, p/n 5968-3501E
- Agilent E2928A 32/64bit, 66 MHz, PCI Exerciser & Analyzer, technical specifications, p/n 5968-3506E
- Agilent E2929A PCI Exerciser & Analyzer, technical specifications, P/n 5968-8984E
- Agilent E2922A PCI-X Master Target Card, technical overview, p/n 5968-9577E
- Agilent E2940A CompactPCI Exerciser & Analyzer, technical overview, P/n 5968-1915E
- Agilent E2976A System Validation Pack, Agilent E2977A System Test Library, technical overview, p/n 5968-3500E
- Agilent E2920 Computer Verification Tools, PCI Series, brochure, p/n 5968-9694E
- Intel discusses basic concepts of PCI performance and efficient use of PCI with the Agilent E2920 series, case study, p/n 5988-0448ENDE
- HP NSD stabilizes server designs quickly and completely with the Agilent E2920 PCI Series, case study, p/n 5968-6948E
- HP HSTC speeds high-end server testing and reduces engineering costs with the Agilent E2920 PCI Series, case study, p/n 5968-6949E
- Agilent E2920 Verification Tools, PCI Series gives Altera Corporation competitive Advantage, case study, p/n 5968-4191E

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