

## Differences Between PCIe and PCI-based Pro Tools|HD Systems

### Summary

There are some technical differences between the PCI Express (PCIe) and PCI versions of the Pro Tools|HD system, but for most users they both provide very similar DSP power.

### Key facts

- The PCIe HD Accel card uses a combination of the chip-types used on the Core and Accel PCI cards
- This gives the PCIe version more processing power than a PCI Core, and a little less than a PCI Accel.
- In larger systems (HD 3 and greater), this difference is insignificant.
- In smaller systems (HD 1, HD 2) there are some noticeable differences, but for many typical sessions using a combination of different algorithms, the differences are minor.
- The PCIe version of the HD 1 system is capable of running Accel-only plug-ins – this is not the case with HD1 for PCI.

For more specifics and detailed information on system differences, please see the explanations below.

### Power Differences Relate to System Size

Technically speaking, there are more “MIPs” (*millions of instructions per second*) available on the new HD PCIe card than the HD Core for PCI, though the increase in power experienced by the user depends upon individual plug-in efficiencies. Users of HD 1 for PCIe may see a significant performance gain versus HD 1 for PCI systems, particularly if they tend to use many instances of just a few different plug-ins and if those plug-ins have been optimized for Pro Tools 7. However, with HD 2 and HD 3, there is a much smaller difference in power between the systems. In fact, with systems larger than HD 3, there is no advantage to running on PCIe versus PCI other than slot-type compatibility.

As a result, ICON system users or others requiring higher card-count systems can be satisfied that they are working with the high-performance solution they expect, regardless of the slot format, and that the product they use is still “current.”

### The Technical Differences

The chart below details the type of DSPs used in each system type, and the total number of MIPS available. The number of DSP chips on the PCIe card is the same (nine), and we are still using the same actual DSPs as used on the PCI Core (“Prestos”), and on the PCI Accel (“321’s”), just in a different combination than before.

PCI	# of Presto Chips	# of 321 Chips with SRAM	# of 321 Chips w/o SRAM	Total MIPS	PCIe	# of Presto Chips	# of 321 Chips with SRAM	# of 321 Chips w/o SRAM	Total MIPS	MIPS Delta	MIPS % Delta
HD 1	9	0	0	900	HD 1	3	4	2	1620	720	80%
HD 2	11	4	3	2640	HD 2	6	8	4	3240	600	23%
HD 3	13	8	6	4380	HD 3	9	12	6	4860	480	11%
HD 4	15	12	9	6120	HD 4*	12	16	8	6480	360	6%
HD 5	17	16	12	7860	HD 5*	15	20	10	8100	240	3%
HD 6	19	20	15	9600	HD 6*	18	24	12	9720	120	1%

**Figure 1: MIPS and chip comparison between PCI- and PCIe-based HD systems**

\* Due to expansion slot constraints in current computers, a Pro Tools|HD 3 Accel system is the largest system currently possible within the computer itself with PCIe. Expanding beyond three cards requires the Digidesign Expansion|HD expansion chassis with a PCIe Host card. Those systems can use PCI Core and Accel cards in up to an HD 6 configuration.

### Raw MIPS Tell Only Part of the Story

It's clear from this chart that PCIe HD 1 and HD 2 systems have more pure MIPS than their PCI counterparts. Why doesn't this translate into more plug-in capability in all cases?

There are two principle reasons:

1) **MultiShell compatibility:** unfortunately, not all plug-ins are multi-shell capable (meaning that different plug-in algorithms can share the same DSP.) Few third-party plug-ins are multi-shell capable (most Digidesign plug-ins are multi-shell, but there are a few exceptions there too.) Entire chips are used by such plug-ins, meaning that on smaller systems only a few different plug-in types can be used before all chips are "occupied." On an HD 1, this might mean only 6 different plug-in types (although usually with several instances of each.)

2) **Accel optimization:** There are several plug-ins that have not been "optimized" for HD Accel chips and therefore don't deliver the proportional increase in power available with Accel technology. For example, Virus Indigo, EchoFarm, Eventide 949, AutoTune, H3000 Factory and Quadravox each consume the same amount of Presto or 321 resources.\*\*

\*\* This is not a complete list of non-optimized Accel plug-ins.

Note that the way plug-ins use RAM can also affect the actual instance counts possible, but this is a less significant factor.

Overall, it can be surmised that more total DSP chips = more power and flexibility with different plug-in types, and hence, more power. Most sessions use a combination of many different plug-in algorithms, so this factor is the most important one for most users.

### **Session Compatibility**

Customers can be confident that all sessions created with PCI versions of HD 1, HD 2, and HD 3 systems will open on their PCIe counterpart. Track counts are not affected, as PCIe Accel cards have three Presto DSPs each—enough to run a full six DSP engine with a Pro Tools|HD 2 system for PCIe. (The sole exception to this is a session requiring several instances of Antares Mic Modeler, which is currently the only Presto-only plug-in.)

However, users should know that it is possible to create sessions on PCIe-based HD 1 systems that cannot be opened on a PCI-based HD 1 system.

### **Expanded Systems with PCIe Machines**

The new dual-core Apple Power Mac G5s have only three PCIe expansion slots. To build an expanded system (greater than HD 3 for PCIe), users will need to incorporate the Digidesign Expansion|HD expansion chassis and use PCI-based HD cards. As described above, expanded systems have almost identical performance capabilities compared to a PCIe-based system with more than three cards. Expansion|HD also provides a convenient way for current users of expanded systems to upgrade their CPU to new, faster models without the need to change their Pro Tools HD cards.

### **The Future is Safe**

Digidesign will continue to make both the PCI and PCIe versions of HD cards and we expect to do so as long as demand for both types exists. Our intent is to support the widest possible range of computers. Windows computers with multiple PCIe slots will be qualified for use when they become widely available.