

Application Note

Extended PCI Bus Extension

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Computer Performance

Extending the internal computer system PCI bus over the Gigabit Ethernet will cause minimal impact on the system performance. In most cases the performance impact is not perceivable by the user. However, applications involving a lot of display updates will be more likely to have an impact on their system performance.

Computer Boot Process

Users may experience the computer system boot process taking slightly longer when using the DeTwo System. This is mostly due to the additional system resources available with the connection of the Desktop Appliance needing assigning during the boot process. The additional system resources required with the DD System can become more complicated and may take some amount of time for the system to resolve the system resources needed for all the PnP devices.

Windows 2000 and Windows XP can automatically detect and install Plug and Play (PnP) devices, as long as the system has PnP capable BIOS and drivers for the PnP capable devices. All PCI bus devices and slots contained in the Desktop Appliance are PnP compatible.

System resources for PnP devices can typically be assigned either during the boot POST (Power On Self Test), or if set in BIOS the OS can be allowed to perform the task. It is typically better to let the OS resolve the system resources.

PnP performs the following processes automatically.

1. PnP device is identified.
2. System resources required are determined and assigned so that there are no conflicts with other devices.
3. The device is configured as necessary.
4. Any drivers required for the device to run are loaded.
5. Any changes in the configuration are reported to the system.

Computer Hardware & Applications

For nearly all instances and with most configurations, interacting with the system and running applications has no perceivable impact on performance due to the extended link between the PCI Add In card and the Desktop Appliance. The performance of the computer's resources utilising the extended link between the PCI Add In card and the Desktop Appliance is dependent upon many factors. These factors include the capability of the PCI device being used in the Desktop Appliance PCI slot, application efficiency, and the number of Desktop Appliance devices requiring throughput on the link.

The following items can impact performance and increase PCI bus traffic across the link:

Graphics controllers

More available video memory is best. The amount of video memory on a graphics card which is local to the Desktop Appliance can inversely affect the number of times a graphics controller needs to access system memory within the computer. This creates increased traffic across the PCI bus and the DD System link as the controller pages in and out of system memory and can affect system performance.

In addition to this a video controller that has an amount of dedicated video memory per head (such as a Matrox G450MMS) will always have better performance than one with memory that is shared across all channels (such as a G550MMS).

Amulet also recommend that in addition to always using the latest drivers and the best cards you should configure your graphics cards for an individual resolution per head rather than a resolution that spans all of the heads as this will also significantly improve graphics performance.

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Application Efficiency

Some Windows applications are not suited or fully optimised to run efficiently over an extended PCI bus. The standards agency that defines the PCI specification (PCISIG) recommends that system architecture and applications issue minimal occurrences of Read transactions since it takes more time to acknowledge the command on return as opposed to Write commands, which simply 'pushes' the data. The consequence of issuing multiple Read operations is not as apparent on computers when the bus is local. However, when the bus is extended over greater distances, this phenomenon is amplified. This behaviour is mostly prevalent on internally written custom programs. This has been witnessed in a few incidences within financial trading and CAD/GIS applications.

Video Output

The video format of the onboard chipset or installed graphics card can impact system performance as this is governed by attributes such as screen resolution, refresh rate and colour depth as well as graphics card architecture. For example, with PCI based multi-headed graphics cards using multiple graphics processor based architectures, users can expect an average of a 50% drop in 2D graphics performance when changing from a single display output to a dual-head configuration which is attributable to doubling the resolution and thereby the amount of data utilising the bus. This reduction is measured using benchmark software that measures overall performance in drawing lines, shapes, fonts and GUI elements. This performance drop typically is negligible from the perspective of the user, but may become noticeable when other PCI bus devices within the Desktop Appliance require consistent use of the link between the Desktop Appliance and PCI Add In card. A USB usage scenario of this is described below.

USB Data Transfer

Since most data transmitted through the USB ports of the appliance is transported along the extended bus, this traffic can affect system performance. USB 2.0 capable devices can transfer at data rates up to 480 Megabits per second (Mb/s). It is recommended that devices transmitting large amounts of data be limited. USB devices such as an attached, external hard drive or USB camera with large video resolutions (1280x1024 and higher) can cause noticeable performance degradation with extensive use. It is advisable to test and validate all applications to be installed on this system. In rare instances, dependent upon the system configuration and the above items, the following actions may show performance degradation that is perceivable by the user:

- Resizing a window from maximised/minimised state may take slightly longer to complete. (Approximately 1 second or less).
- Flash type animations may be impacted.
- Menu response may be delayed by up to one second in order to display completely. (Including the Start menu and some context menus belonging to processes in the Task Bar).

If users experience a reduction in performance, there are a few steps that can be taken to minimise the effects:

1. Reduce as many unnecessary graphical elements of the OS as possible, including:
 - A. Wallpaper
 - B. Disabling as many Luna GUI elements within Windows XP as possible, such as showing window contents while dragging, animating windows, etc. These settings can be disabled within the advanced tab of System Properties.
2. Always ensure that all drivers are properly installed and recognised. This is especially true for video cards and controllers. Also resolve any hardware conflicts seen in the Device Manager.
3. Disable any unused device controllers within the Desktop Appliance, such as USB, audio, etc.
4. Increasing the amount of memory on the graphics card will improve system performance.
5. Ensure both system drivers and operating system are patched to the latest levels.