

## Ensuring Compatible PCI Slots for Dialogic Media Cards

**TN105**

**November 08**

# Objectworld™

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## 1 Introduction

Understanding the types of PCI slots that are in the server platform for your Objectworld UC Server is essential for a successful deployment with Dialogic media cards. The slots in your server platform must support both the physical size of the media cards you are using as well as a compatible bus interface.

This technical note provides:

- an overview of the different physical PCI card sizes you will encounter in server platforms;
- an overview and backwards compatibility information for the PCI™ (Peripheral Component Interconnect) and PCI-X™ expansion card interface standards;
- an overview and backwards compatibility information for the PCI EXPRESS® (PCIe®) full duplex serial link expansion card interface standard (formerly known as 3GIO); and
- a listing of the Dialogic media cards that are currently compatible with Objectworld UC Server™, indicating their compatible PCI slot types.

## 2 PCI Card Physical Sizes

There are three different physical sizes for PCI cards:

- **Full-length** PCI cards are 106.68mm (4.2 inches) high X 312mm (12.283 inches) long.
- **Half-length** PCI cards are 106.68mm (4.2 inches) high X 175.26mm (6.9 inches) long.
- **Low-profile or "Slim"** PCI cards range from 36.07mm (1.42 inches) to 64.41mm (2.536 inches) high and from 119.91mm (4.721 inches) to 167.64mm (6.6 inches).

Each size PCI card may be available with any type of PCI electrical interface: PCI™, PCI-X™, or PCIe.

Full-length card slots in server and PC platforms are compatible with all three types of PCI card sizes. However, Half-length slots do not support Full-length cards and will only support the Half-length and Low-profile card sizes. And Low-profile slots will not support Full-length or Half-length cards and will only support Low-profile cards.

**Note: All of the Dialogic media cards that are supported by Objectworld UC Server™ are Full-length cards except for the D/4PCIU media cards which are Half-length.**

PCI card slots in server and PC platforms do not always support Full-length cards. Many server platforms, especially rack mount platforms, support mostly and in some cases only, Half-length compatible slots. Consequently, it is important to verify the physical size of the cards supported in each slot of the server or PC platform that you intend to use to host UC Server to ensure that your platform can support your media cards. Verify the manufacturer's specifications for the platform you intend to host your UC Server solution to ensure it will support the number and type of media cards you intend to employ. In some cases manufacturers do not provide accurate information as to slot size. If possible verify the physical size of each slot in your intended platform prior to deployment.

If you cannot locate a server or PC platform that will accommodate a media card solution, then consider using 1000, 2000 or 3000 series Dialogic Enterprise Media Gateways instead of a media card solution. See <http://www.dialogic.com/products/gateways/default.htm>.

## 3 PCI and PCI-X

This section provides a review of the history of the PCI and PCI-X standards and the differences between them.

Originally the PCI bus was a 33 MHz, 32 bit bus that utilized 5-volt signaling levels, having a throughput of 133 Mbytes/sec. This bus type is often referred to as “conventional” PCI.

Later, in PCI version 2.1, the PCI bus was updated to operate at 66 MHz, and added 64 bit operation on a bus that would operate using either 5 volt or 3.3 volt signaling. Bus throughput for 32 bit operation doubled to 266 Mbytes/sec while the 64 bit version operated at 532 Mbytes/sec. Cards that support both 3.3-volt and 5-volt signaling are often referred to as “Universal PCI Cards.”

In PCI versions 2.3 and 3.0 bus signaling for the original “5-volt only signaling” PCI was removed. PCI Cards that support 3.3V only operation and Universal PCI Cards that support 3.3 and 5-volt signaling will operate in use PCI version 2.3 and 3.0 slots. PCI version 2.3 and 3.0 are backwards compatible only with PCI Version 2.1 and NOT the original PCI.

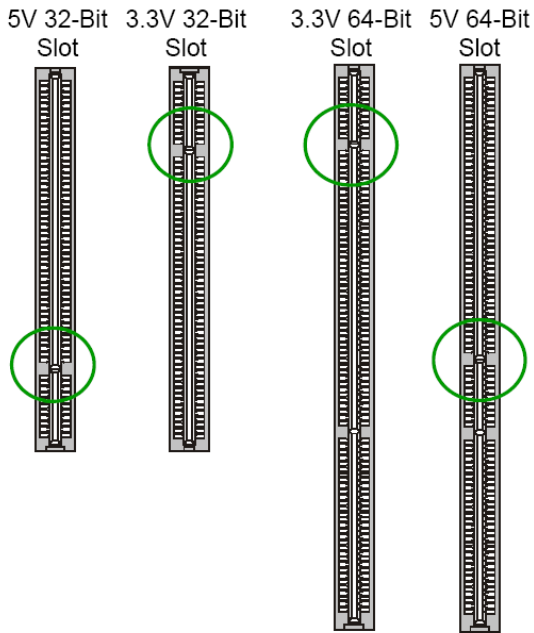
PCI-X Version 1.0 is similar to PCI version 3.0, but only provides 64 bit card slots, and the bus can now operate at 133 MHz (PCI-X 133) in addition to the older 33 and 64 MHz rates (PCI-X 66). Both 32 and 64 bit PCI Cards that support 3.3V only operation or Universal PCI Cards that support 3.3 and 5-volt signaling will operate in PCI-X slots. PCI-X is backwards compatible with PCI versions 2.1, 2.3 and 3.0.

PCI-X version 2.0 is similar to PCI-X version 1.0 but adds two new speed grades PCI-X 266 and PCI-X 533 (266 and 533 MHz respectively) and an Error Correction Code (ECC) capability to the bus. PCI-X version 2.0 is backwards compatible to PCI-X Version 1.0 with the same backwards compatibility to PCI.

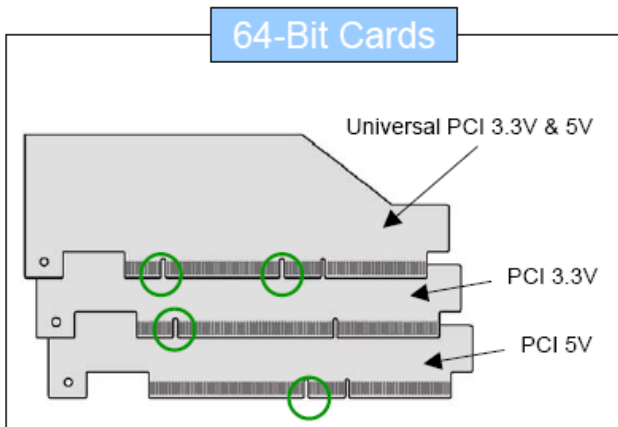
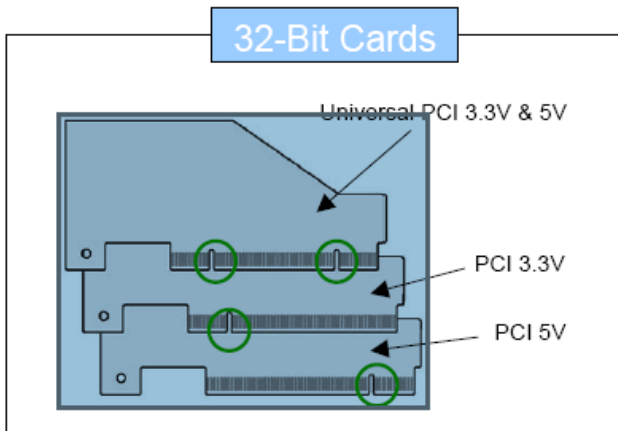
PCI-X is generally backwards compatible with most cards based on the PCI version 2.1 or later standard, meaning that, a PCI-X card can be installed in a PCI slot, provided it has the correct voltage keying for the slot and (if inserting into a 32-bit slot) nothing obstructs the overhanging part of the edge connector. You can plug 32 Bit Cards into 64 bit sockets provided that their keying for bus signaling voltages are compatible.

The PCI-X bus is not compatible with the older 5-volt cards but newer 3.3-volt PCI cards will work in a PCI-X slot. Apart from this, PCI and PCI-X cards can generally be intermixed on a PCI-X bus, but the speed will be limited to the speed of the slowest card. For example, a PCI version 2.3 device running at 32 bits and 66 MHz on a PCI-X 133 bus will limit the total throughput of the bus to 266 MB/s. To get around this limitation and the voltage compatibility issue, many motherboards have separate PCI-X channels that can be dedicated to different PCI hardware families if needed, allowing for better backwards compatibility while maintaining higher total system bandwidth.

The diagram below shows the size and keying for the four PCI slot types (voltages refer to signaling NOT power supply):



The diagrams below shows the keying for the three types of card keying for 32 and 64 bit cards (voltages refer to signaling NOT power supply):



## 4 PCI Express (PCI-E, PCIe)

PCI EXPRESS (PCIe) (formerly known as 3GIO) was designed to replace the “conventional” PCI expansion bus, the high-end PCI-X bus and the AGP graphics card interface. Unlike previous PC expansion interfaces, rather than being a bus it is structured around point-to-point full duplex serial links called lanes. **Consequently, PCI Express slots are NOT compatible with PCI or PCI-X cards, nor are PCI/PCI-X slots compatible with PCI Express cards.**

In PCIe version 1.1 (currently the most common version) each lane carries 250 MB/s (250 million bytes per second) in each direction. Each PCIe slot carries one, two, four, eight, sixteen or thirty-two lanes of data between the motherboard and the card. Lane counts are written with an x prefix e.g. x1 for a single-lane card and x16 for a sixteen-lane card. The largest size in common use (mostly for video cards) is x16, giving a transfer rate of 4 GB/s (250 MB/s x 16) in each direction. Putting this into perspective, a single lane has nearly twice the data rate of a normal PCI, a four-lane slot has a comparable data rate to the fastest version of PCI-X version 1.0, and an eight-lane slot has a data rate comparable to the fastest version of AGP.

PCIe slots come in a variety of physically different sizes referred to by the maximum lane count they support, i.e. X1, x2, x4, x8, x16 and x32. A PCIe card will fit into a slot of its size or bigger, but not into a smaller PCIe slot.

The number of lanes actually connected to a slot may also be less than the number supported by the physical slot size. An example is a x8 slot that actually only runs at x1; these slots will allow any x1, x2, x4 or x8 card to be used, though only running at the x1 speed. This type of socket is described as a 'x8 (x1 mode)' slot, meaning it physically accepts up to x8 cards but only runs at x1 speed. The advantage gained is that a larger range of PCIe cards can still be used without requiring the motherboard hardware to support the full transfer rate - so keeping design and implementation costs down.

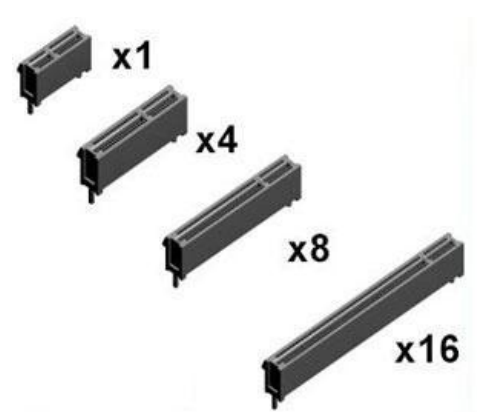
The Table below shows the compatibility between the four PCIe card types and the four slot types:

### PCI Express Card/Slot Interoperability

PCI Express Implementation	x1 Slot	x4 Slot	x8 Slot	x16 Slot
<b>x1 Card</b>	Required	Required	Required	Required
<b>x4 Card</b>	No	Required	Allowed	Allowed
<b>x8 Card</b>	No	Allowed*	Required	Allowed
<b>x16 Card</b>	No	No	No	Required

*\*These implementations have an x8 connector wired as an x4 slot. The slot will accept x8 cards, but run at x4 speeds.*

The illustration below shows the sizes of the four connector types.



## 5 Dialogic Cards Supported by Objectworld UC Server

Objectworld UC Server™ supports three basic types of Dialogic media cards for use with PBX integrations (D4PCIU, D120JCT, D82JCT, and D42JCT which is not normally recommended due to its low marginal cost difference with the D82JCT. D42JCT is identical to D82JCT but is populated with only 4 ports at a much higher cost per port.). A listing of these currently available cards is provided below.

For more information visit: [http://www.dialogic.com/products/tdm\\_boards/media\\_processing/default.htm](http://www.dialogic.com/products/tdm_boards/media_processing/default.htm).

Card Type	Product Description	Code w/Revision	Compatible Slots
<b>D4PCIUFEW (887440)</b>	4-port Analog, Loop-Start, PCIe	887-440-31	PCIe 1x lane or higher
<b>D4PCIUFW (881775)</b>	4-port Analog, Loop-Start, PCI	881-775-30	PCI 2.x, 3.x, or PCI-X slot
<b>D120JCTLS (854660)</b>	12-port Analog, Loop-Start, PCI	854-929-01	PCI 2.x, 3.x, or PCI-X slot
<b>D120JCTLSEW (884594)</b>	12-port Analog, Loop-Start, PCIe	884-594-33	PCIe 1x lane or higher
<b>D120JCTLSU (854889)</b>	12-port Analog, Loop-Start, PCI	854-891-01	PCI 2.x, 3.x, or PCI-X slot
<b>D120JCTLSW (881762)</b>	12-port Analog, Loop-Start, PCI	881-762-31	PCI 2.x, 3.x, or PCI-X slot
<b>D82JCTU (858213)</b>	8-port PBX integration board, PCI, non-RoHS	858-213-05	PCI 2.x, 3.x, or PCI-X slot
<b>D82JCTUEW (887532)</b>	8-port PBX integration board, PCIe, RoHS 5/6	887-532	PCIe 1x lane or higher
<b>D82JCTUW (882998)</b>	8-port PBX integration board, PCI, RoHS 5/6	882-998-31	PCI 2.x, 3.x, or PCI-X slot

Please note the following restrictions for the following older versions of the D82JCT-U, 8-port PBX integration boards:

- The Original ISA bus version of the D82JCT-U (D82JCTU) was not compatible with any PCI slots, so you must ensure that you are using a compatible ISA slot for this type of card.
- The Original PCI bus version of the D82JCT-U (D82JCTUPCI) supports only +5 V signaling PCI slots. If you are using this type of card, then ensure that you are using an original PCI bus compatible slot rather than a PCI version 2.x, 3.x, or PCI-X slot.
- An older universal version of the D82JCT-U (D82D82JCTUPCIUNIV) supports both +5 V and +3.3 V signaling PCI expansion slots. If you are using an older card of this type, then ensure that you are using a PCI version 2.x, 3.x, or PCI-X slot.

All card types except the D4PCIU require Full-length PCI slots. The D4PCIU will fit into a Half-length slot.

If you are building a new installation, Objectworld recommends that you employ the PCIe version for all card types. All of the Dialogic PCIe cards that are supported employ the x1 lane configuration, allowing them to be used in any type of PCI slot having the appropriate length for that type of card.

If you cannot locate a server or PC platform that will accommodate a media card solution, then consider using 1000, 2000 or 3000 series Dialogic Enterprise Media Gateways instead of a media card solution. See <http://www.dialogic.com/products/gateways/default.htm>.