

Applications

- Voice over IP
- IP-telephony Media Servers
- APCO Project 25 Vocoder Platform
- Conferencing
- Digital Voice Recording
- Voice Messaging/Call Center
- Interactive Voice Response (IVR)

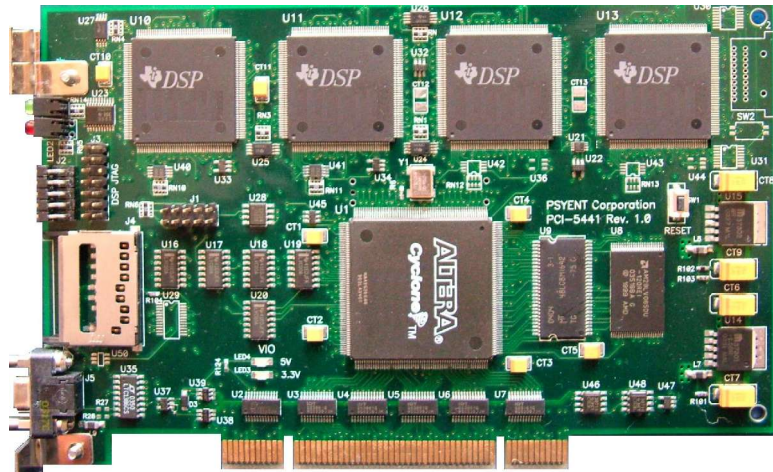
Hardware Features

- Over 2100 DSP MIPS
- Four TI TMS320VC5441 DSPs
- User-programmable Altera Cyclone FPGA with Nios-II processor
- 32-bit, 33 MHz PCI Rev. 2.1 interface
- Supports 3.3 v and 5 v I/O signaling
- Integrated DMA engine for high-speed media transfers
- SecureDigital (SD) card interface
- 16 MB SDRAM, 8 MB Flash
- Local TDM conferencing bus
- Serial UART with optional rear-panel mini DB-9 connector

Software Features

- All software 100% open-source
- Linux 2.6 kernel
- Flash/RAM file system support
- Advanced boot monitor
- Ethernet interface emulation
- Host-side Linux device drivers

PCI-5441 Media Processing PCI Card



PCI-5441

Product Overview

The PCI-5441 is a media processing solution that provides a unique combination of hardware, software and programmable logic to support a broad range of media processing applications. Its flexible and open architecture are designed to meet the requirements of even the most demanding OEM/VAR application developers.

Unlike other media processing boards, the PCI-5441 does not restrict developers to host processor/software only applications. The PCI-5441 embraces a completely open architecture that allows developers to add embedded software, DSP algorithms and even custom hardware to meet their unique application requirements. And since the PCI-5441 is 100% open-source, developers have the freedom to customize any of the existing software distributed with the PCI-5441 – including custom programmable logic designs.

The PCI-5441 uses four TI 'C5441 devices to provide more than 2100 MIPS of signal processing capacity distributed among sixteen DSP cores. The industry-standard 'C54 architecture provides developers with access to a large base of algorithms and 3rd party support.

The Linux 2.6 operating system comes standard with the PCI-5441 and runs on the board's Nios-II RISC processor.



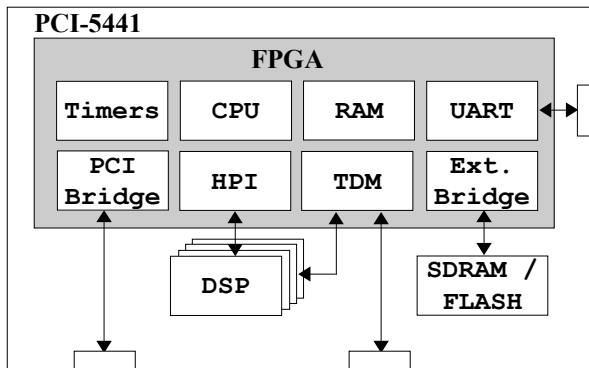


Hardware Description

The PCI-5441 is a 32-bit 33 MHz PCI Revision 2.1 card that supports PCI bus mastering. The card is capable of both 3.3 volt and 5 volt signaling and incorporates universal keying at the PCI edge connector.

The primary components on the PCI-5441 are:

- Altera Cyclone EP1C12 FPGA
- Four Texas Instruments TMS320VC5441 DSPs
- 8M x16-bit SDRAM
- 8 MB Flash



The CPU, PCI Bridge, SDRAM controller and other peripherals are implemented as programmable logic blocks within the FPGA. This arrangement provides a great deal of flexibility for customers that want to deploy their own custom logic such as encryption or compression engines.

The 32-bit Nios-II RISC processor shipped with the PCI-5441 includes a 4 KB instruction cache and a JTAG debug module that supports software download, software breakpoints, 2 hardware breakpoints and 2 data triggers. Several features of the CPU (such as instruction/data cache sizes) can be customized by the user.

Full JTAG access is provided via a rear-panel connector. The JTAG interface can be used for FPGA programming, Flash memory programming,

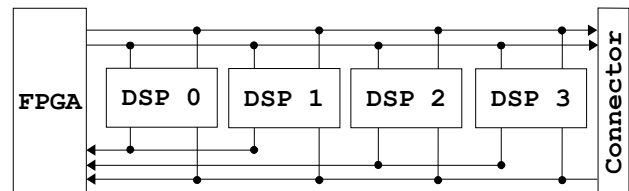
logic debugging and Nios-II software debugging.

The FPGA configuration is stored in a high-speed serial Flash memory device (EPCS4). This device is normally programmed via the JTAG interface. However, a separate on-board header is available for direct programmer access to the device.

The PCI-5441 includes up to four TI 'C5441 DSPs that are directly controlled by the FPGA. Access to each device's memory space is provided via a custom logic block between the 16-bit TI Host Port Interface (HPI) and the Nios-II memory bus.

The main DSP device input clocks are driven directly by a PLL in the FPGA. The PLL input is driven by an on-board 16.384 MHz crystal oscillator. The PLL is user-programmable.

Two serial ports (McBSP) from each DSP are used to implement a local TDM interchange as shown in the Figure below. The two receive (DSP input) highways are shared by all devices. A single transmit (DSP output) highway is also shared by all devices. Two additional transmit highways are shared between DSP 0 and 1, and between DSP 2 and 3. Both receive highways, and a single transmit highway are buffered and routed to an on-board connector to support multi-board configurations.



Software Description

The PCI-5441 is shipped with the Linux 2.6 operating system, a boot monitor and host-side device drivers. The factory programmed flash file system includes a variety of standard utilities, networking support and device drivers that enable communication with the host processor. All software is 100% open-source.

The software also includes host and target drivers that enable "Ethernet emulation." With this feature enabled the PCI-5441 appears as a server that can be accessed via telnet, ftp or http.

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