

Background

The ASIC core industry has been developing for over a decade. Today there exists a wealth of intellectual property (IP) that is readily available from numerous sources. During this time, however, programmable logic did not have the density or the performance needed to accommodate large IP cores.

Today, things have changed considerably. Xilinx is shipping FPGAs like the XL family that have usable densities up to 125,000 gates. Now, not only is the use of pre-defined logic functions in programmable logic a possibility, it is becoming a requirement to meet ever-shrinking product development cycles.

As a result, many ASIC core vendors and system designers are beginning to look at using cores for their programmable logic designs. It is for this reason that Xilinx created the CORE Solutions portfolio of products.

CORE Solutions Products

CORE Solutions products support four application areas. The application areas are as follows:

- **Standard Bus Interfaces** - such as PCI, PCMCIA, USB and Plug-and-Play ISA.
- **DSP Functions** - These range from small building blocks such adders, registers and multipliers, to larger system-level functions such as FIR filters and Reed-Solomon coders.
- **Telecom and Networking** - building blocks for popular communications standards.
- **Base-Level Functions** - a broad category of functions used across many application segments. These include the every small parameterizable LogiBLOX macros up through larger functions such as UARTs and DMA controllers.

CORE Solutions Data Book

The goal of the CORE Solutions portfolio of products is to provide cores with the shortest time-to-market and best possible device utilization the programmable logic industry has to offer. Xilinx has published a brand new data book focused entirely on programmable logic cores and related products. Now there is one definitive sourcebook with detailed descriptions of all Xilinx CORE Solutions.

When you receive your copy of the CORE Solutions Data Book, become familiar with the *Product Listing by Application Segment Table*, (reproduced at the end of this over-

view) which lists all of the functions available today. This table will be your best guide to locating a specific product. If you don't see what you need, check the *AllianceCORE Partner Profiles*, Areas of Expertise section, for each of our AllianceCORE partners. Our partners will be more than willing to discuss the possibility of producing a core specifically for your needs.

Data Book Contents

The contents of the data book are as follows:

- Introduction
 - Program Overview
 - Product Listing by Application Segment
- LogiCORE Products, sold and supported by Xilinx
 - Product Overview
 - PCI
 - DSP
 - CORE Generator products
- AllianceCORE Products, sold and supported by Xilinx' Partners
 - Program Overview
 - Products
 - AllianceCORE Partner Profiles
- LogiBLOX, GUI-based small function generator
- Reference Designs
- Sales Offices, Representatives and Distributors

Ordering Information

To order a copy, request the CORE Solutions Data Book from the Xilinx Literature Department. In the US call 1-800-231-3386. For international locations call 1-408-879-5017 or you can send an E-mail request to:

literature@xilinx.com.

An electronic version of the CORE Solutions Data Book (1.2M Adobe Acrobat .pdf format) can also be downloaded from:

www.xilinx.com/products/logicore/core_sol.pdf

LogiCORE Products

LogiCORE products are sold, licensed and supported by Xilinx. They are developed internally by Xilinx or jointly with a partner.

The cores that Xilinx provides as LogiCORE products typically fall into one of two categories. The first are high-performance interface cores that require a thorough understanding and control of the FPGA technology and

implementation software in order to achieve the desired performance and complexity. An example of a core in this category is the LogiCORE PCI interface.

The second category are cores that benefit from a very specialized implementation in the FPGA. An example is the LogiCORE DSP modules that are implemented using a unique algorithm, Distributed Arithmetic. This algorithm fits the lookup-table-based architecture of the FPGA. The result is outstanding performance and device utilization, often more than 10 times better than generic HDL descriptions.

Xilinx CORE Generator

In addition to actual cores, Xilinx is committed to develop enabling design tools and methodologies to facilitate usage of cores with FPGAs. The first products available in this category are the web-based CORE Generator for PCI and the CORE Generator for DSP (available on CD). This innovative methodology for acquiring and using cores combines the benefits of

- a firm core with predictable performance, and
- the flexibility of system level design, facilitated by behavioral languages such as VHDL and Verilog.

In addition, because Xilinx is using the web as a distribution mechanism, you always have access to the latest versions and enhancements of the cores at:

www.xilinx.com/products/logicore/logicore.htm

The LogiCORE products are customized to fit your specific application using an intuitive graphical user interface. Based on your inputs, the tool then generates a proven core with highly predictable timing that can be integrated using any VHDL-, Verilog- or schematic-based design flow. As a result, you can integrate several individually proven cores with given performance into one system on a single FPGA. Because each core is already verified, the time-to-market benefits are maintained for high-complexity FPGAs.

Xilinx PCI Solutions

Xilinx' PCI solution includes devices, tools and cores needed to build a cost-effective single-chip PCI system in record time.

- LogiCORE PCI - the only proven PCI core with predictable timing
- XC4000E/XL - the industry's fastest FPGAs that allow you to integrate the PCI interface plus 5 to 60 thousand gates of user designed logic
- HardWire - an automatic migration path to a low-cost chip for volume production
- CORE Generator - for easy configuration and integration of the LogiCORE PCI module
- 3rd party Design Centers - with PCI expertise available for special applications and customization of the core

PCI is an extremely high-performance and complex specification that is challenging to meet in any technology. To meet the stringent PCI specification the core is carefully hand-tuned for the targeted architecture. Placement and routing for the critical parts of the core is locked down to ensure that timing can be met every time the core is used.

To achieve our goals, the LogiCORE development team is working closely with both the IC and Software teams. As an example of this teamwork, new methodologies for characterizing and modeling our FPGAs have been developed. The result is access to state of the art technology and expertise, that allows you to complete your PCI application in record time.

Xilinx has sold over 250 licenses of the LogiCORE PCI interface and has built up solid knowledge about PCI. We are committed, and will continuously develop our PCI products to remain state of the art.

Xilinx DSP Solutions

Using an FPGA to implement high performance DSP functions often allows a radical performance advantage over fixed processors while maintaining maximum flexibility and the shortest time-to-market. Until now, tools to automate the design process have been lacking and most designs have been completed manually by experienced FPGA designers.

With the introduction of Xilinx' CORE Generator for DSP, complex parameterized DSP building blocks can be implemented automatically with performance and density equal to or better than a hand-tuned implementation. LogiCORE DSP modules can be used with VHDL-, Verilog- or schematic based design methodologies.

Higher level DSP cores are available from our AllianceCORE partners.

Acquiring LogiCORE Products

LogiCORE products are available from your local Xilinx sales representative similar to other Xilinx software products. Xilinx and your local sales representative will also be your primary source for support of the core, the devices and the design tools.

You can also send email questions to:

logicore@xilinx.com.

AllianceCORE Overview

The AllianceCORE program is a cooperative effort between Xilinx and independent third-party core developers. It is designed to produce a broad selection of industry-standard solutions dedicated for use in Xilinx programmable logic.

Xilinx takes an active role with its partners in the process of productizing AllianceCOREs. This is unique to the AllianceCORE program. Because the process is so involved,

we work closely with our partners to select the right cores first. This naturally limits the number of partners we can work with at any one time and subsequently the number of available cores. At the same time it raises the quality and usability of the cores that are offered.

AllianceCORE Criteria

A core must meet a minimum set of criteria before it can receive the AllianceCORE label.

Core Selection

The AllianceCORE program looks at cores from a practical point of view. A programmable logic version of a core must have value over an ASIC or standard product version of the same function. It must be cost effective and make sense for use in a programmable device in a production system. If a candidate core does not pass these simple tests, then it does not make sense to invest the effort to convert it to an AllianceCORE module.

Core Qualification

Generic, synthesizable cores offer maximum flexibility for users with unique requirements. This is typically the format for cores provided to the ASIC market. With programmable logic, however, this flexibility can come at the expense of efficiency and performance. It can take a considerable amount of effort to get a specific core to synthesize in a way that meets density and timing requirements. Time spent trying to accomplish this can quickly reduce the time-to-market advantage of using programmable logic and cores in the first place.

Xilinx is not interested in promoting generic, synthesizable functions as AllianceCOREs. Instead, AllianceCOREs are generally provided as parameterizable black-boxes that allow customization in critical areas. This guarantees that the implementation is optimized for density while still meeting performance, preserving the time-to-market value of programmable logic. Flexibility is provided by allowing you to quickly implement your unique logic on the same device. Source code versions of the cores are also available from the partners at additional cost for those who need ultimate flexibility.

Announced AllianceCOREs have been implemented and verified in a Xilinx device. They are available immediately for purchase in a Xilinx-specific format. Timing-critical cores designed to adhere to an industry standard also come with appropriate constraints files in order to guaran-

tee functionality and compliance. AllianceCOREs originated from either schematic or HDL entry tools.

Core Integration

AllianceCOREs are not just cores, they are complete solutions for system designs. While cores by themselves have value, in many cases it is often not enough to just supply a generic core. You may need additional tools such as system software and prototyping equipment to help you rapidly integrate the core into your design, perform system debug in a real-world environment, and then quickly convert the prototype to a production unit. This is particularly true of complex functions.

Many AllianceCORE functions are supported by Xilinx-based demonstration or prototyping boards. Some also have system simulation models or debug software. All of this allows you to evaluate and work with the function before you have to layout your board. These tools are provided by the AllianceCORE partner, usually at additional cost. Descriptions of the support tools available for each core are included in the CORE Solutions Data Book.

Complete solutions like these help preserve the value of using programmable logic while minimizing the support burden for the core provider.

Acquiring AllianceCORE Products

AllianceCORE products are sold and serviced directly by the AllianceCORE partners since they are the experts for their particular products. They are responsible for pricing, licensing terms, delivery and technical support. Contact information for each partner is included in the AllianceCORE Partner Profiles section of the CORE Solutions Data Book.

If you want additional information about the AllianceCORE program or are interested in becoming a partner, contact Xilinx directly.

Xilinx, Inc.
2100 Logic Drive
San Jose, CA 95124
Attn: Mark Bowlby, AllianceCORE Product Manager
Phone: +1 408-879-5381
Fax: +1 408-879-4780
E-mail: alliancecore@xilinx.com
URL: www.xilinx.com/products/logicore/alliance/tblpart.htm

Table 1: Product Listing by Application Segment

Check www.xilinx.com/products/logicore/tbils_cores.htm for the latest listing of available Cores

Function	CORE Solution
Standard Bus Interfaces	
IIC Two-Wire Serial Interface	AllianceCORE
ISA Plug and Play Interface	Reference Design
ISA Interface for JPEG Motion Codec	Reference Design
PCI Master/Slave Interfaces 1.2.0	LogiCORE
PCI Master/Slave Interfaces 2.0.0	LogiCORE
PCMCIA Fax/Modem	AllianceCORE
PCMCIA Library	AllianceCORE
USB - Low-Speed Function Controller	AllianceCORE
USB - Full-Speed Function Controller	AllianceCORE
USB - 3-Port Hub Controller	AllianceCORE
DSP Functions	
1's Complement	LogiCORE
Accumulator, Scaled by 1/2	LogiCORE
Adder, Registered	LogiCORE
Adder, Registered Loadable	LogiCORE
Adder, Registered Scaled	LogiCORE
Adder, Registered Serial	LogiCORE
Adders, Subtractors, Accumulators	Reference Design
Comb Filter	LogiCORE
Correlator, 1-D RAM Based	LogiCORE
Correlator, 1-D ROM Based	LogiCORE
Delay Element	LogiCORE
FIR Filter, 16-Tap, 8-Bit	Reference Design
FIR Filter - Serial Distributed Arithmetic	LogiCORE
FIR Filter - Dual Channel Serial Distributor Arithmetic	LogiCORE
Integrator	LogiCORE
Memory - 16-Word Deep Register Look-up Table	LogiCORE
Memory - 32-Word Deep Register Look-up Table	LogiCORE
Memory - 16-Word Deep Registered RAM	LogiCORE
Memory - 32-Word Deep Registered RAM	LogiCORE
Memory - Registered Synchronous RAM	LogiCORE
Memory - Registered ROM	LogiCORE
Multiplier, Constant Coefficient	LogiCORE
Multiplier, Constant Coefficient (pipelined)	LogiCORE
Multipliers, Parallel - Area Optimized	LogiCORE
Multipliers, Parallel - Performance Optimized	LogiCORE
Parallel to Serial Converter	LogiCORE
Reed-Solomon Decoder	AllianceCORE
Reed-Solomon Encoder	AllianceCORE
SDA FIR Control Logic	LogiCORE
Sine/Cosine	LogiCORE
Square Root	LogiCORE
Subtractor, Registered	LogiCORE
Subtractor, Registered Loadable	LogiCORE

Table 1: Product Listing by Application Segment (Continued)

Check www.xilinx.com/products/logicore/tbils_cores.htm for the latest listing of available Cores

Function	CORE Solution
Time Skew Buffer - Non-Symmetric 16-Deep	LogiCORE
Time Skew Buffer - Non-Symmetric 32-Deep	LogiCORE
Time Skew Buffer - Symmetric 16-Deep	LogiCORE
Transform, DFT	LogiCORE
Transform, FFT	LogiCORE
Base-Level Functions	
16450 UART	AllianceCORE
16550A UART with RAM	AllianceCORE
8250 Asynchronous Communications	AllianceCORE
8254 Programmable Timer	AllianceCORE
M8255 Programmable Peripheral Interface	AllianceCORE
XF8255 Programmable Peripheral Interface	AllianceCORE
Accumulator	LogiBLOX
Adder/Subtractor	LogiBLOX
Clock Divider	LogiBLOX
Comparator	LogiBLOX
Constant	LogiCORE
Constant	LogiBLOX
Counter	LogiBLOX
Counter, Loadable Binary	Reference Design
Counter, Ultra-Fast Synchronous	Reference Design
Counter, Accelerating Loadable	Reference Design
Data Register	LogiBLOX
Decoder	LogiBLOX
FIFOs in XC4000 RAM	Reference Design
FIFO, High-Performance RAM-Based	Reference Design
FIFO, Register-Based	Reference Design
Frequency/Phase Comparator for PLL	Reference Design
Gates, Simple	LogiBLOX
Harmonic Frequency Synthesizer and FSK Modulator	Reference Design
Input/Output	LogiBLOX
Microcontroller, Dynamic	Reference Design
Memory (ROM, RAM, Synch-RAM, Dual Port RAM)	LogiBLOX
Multiplexer	LogiBLOX
Multiplexers, Barrel Shifters	Reference Design
Multiplexer, Two Input	LogiCORE
Multiplexer, Three Input	LogiCORE
Multiplexer, Four Input	LogiCORE
Pad	LogiBLOX
Pulse-Width Modulation	Reference Design
Register	LogiCORE
Serial Code Conversion between BCD and Binary	Reference Design
Shift Register	LogiBLOX
Tristate	LogiBLOX