



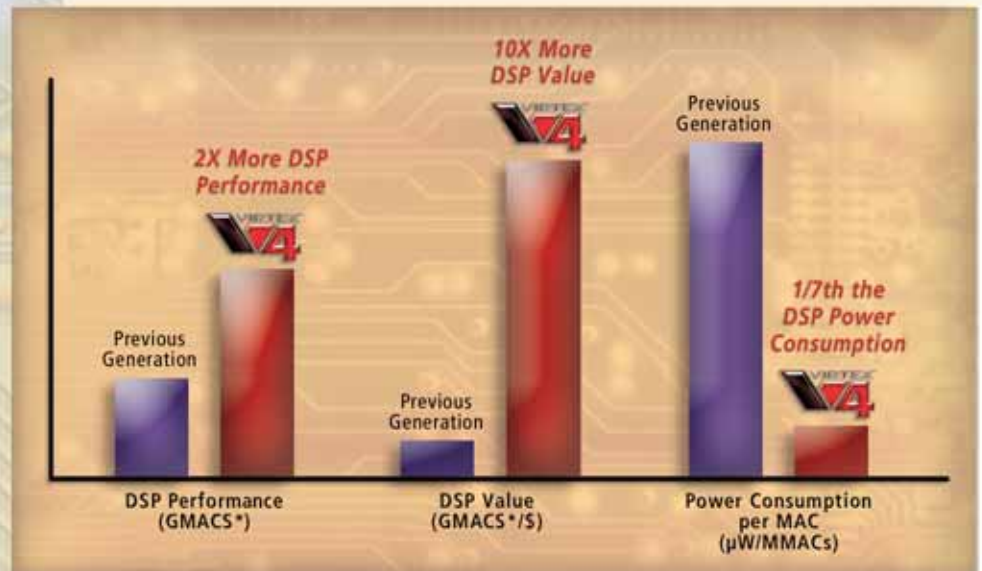
## Industry's Highest DSP Performance, Now at New Low Cost Points

Today's signal-processing systems demand increasingly higher performance and flexibility.

Xilinx Virtex-4™ FPGAs are ideally suited for high-performance signal-processing tasks traditionally serviced by an ASIC or ASSP. They allow you to create high-performance DSP engines that can boost the performance of your programmable DSP system by performing complementary co-processing functions in digital communications, video/imaging, and other applications. The Virtex-4 FPGA family is the newest and most powerful addition to the Xilinx XtremeDSP™ solution, providing blazing DSP performance with unrivalled economy. With up to 512 XtremeDSP slices operating at 500 MHz, these devices can implement complex tasks such as:

- Hundreds of IF-to-baseband down conversion channels
- 128X chip-rate processing for spread-spectrum systems
- High-definition H.264 and MPEG-4 encode/decode algorithms

The XtremeDSP solution accelerates your products' time-to-market through superior devices, design tools, intellectual property cores, and design services. This gives you the fastest means of designing, verifying, and deploying your DSP algorithms and systems in FPGAs.



### XtremeDSP Slice Delivers Maximum Performance and Efficiency

The 500 MHz XtremeDSP slice delivers unmatched versatility, efficiency, and performance.

- Configure each XtremeDSP slice for over 40 DSP functions, such as multiply-accumulate, multiply, addition, and multiplexing
- Reduce DSP power consumption by 86% (57µW/MHz) and save precious logic resources for other tasks
- Cascade multiple XtremeDSP slices at full system speed to build complex filters and multi-precision functions

### Optimized Performance and Cost for Your DSP Applications

All three Virtex-4 platforms offer XtremeDSP capabilities. Choose the device that provides the optimal ratio of DSP performance for your unique application.

- Virtex-4 SX devices offer the most cost-effective implementation of ultra-high-performance DSP functionality, with the highest ratio of XtremeDSP slices — up to 512 slices delivering up to 256 GMACS\* performance
- Virtex-4 LX devices offer ample XtremeDSP slices and add more logic, memory, and I/O resources
- Virtex-4 FX devices add embedded PowerPC™ processors and RocketIO™ multi-gigabit transceivers

### Easiest-to-use Design Solutions for FPGA-based DSP

Xilinx and its partners provide complete solutions for rapid DSP development and implementation.

- Reduce design time with System Generator for DSP
- Implement fast, highly optimized algorithms with a rich DSP IP library
- Bring products to market faster with award-winning technical support and DSP services

\* 18x18 bits, 48-bit accumulator

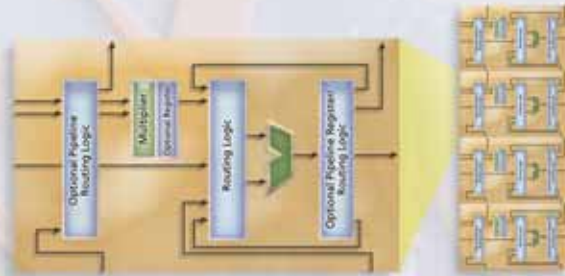
# World's Highest-Performance, Best

## Versatile 500 MHz XtremeDSP Slices

**The Challenge:** Implement high-performance DSP algorithms more cost-effectively.

**The Virtex-4 Solution:** Up to 512 new XtremeDSP slices

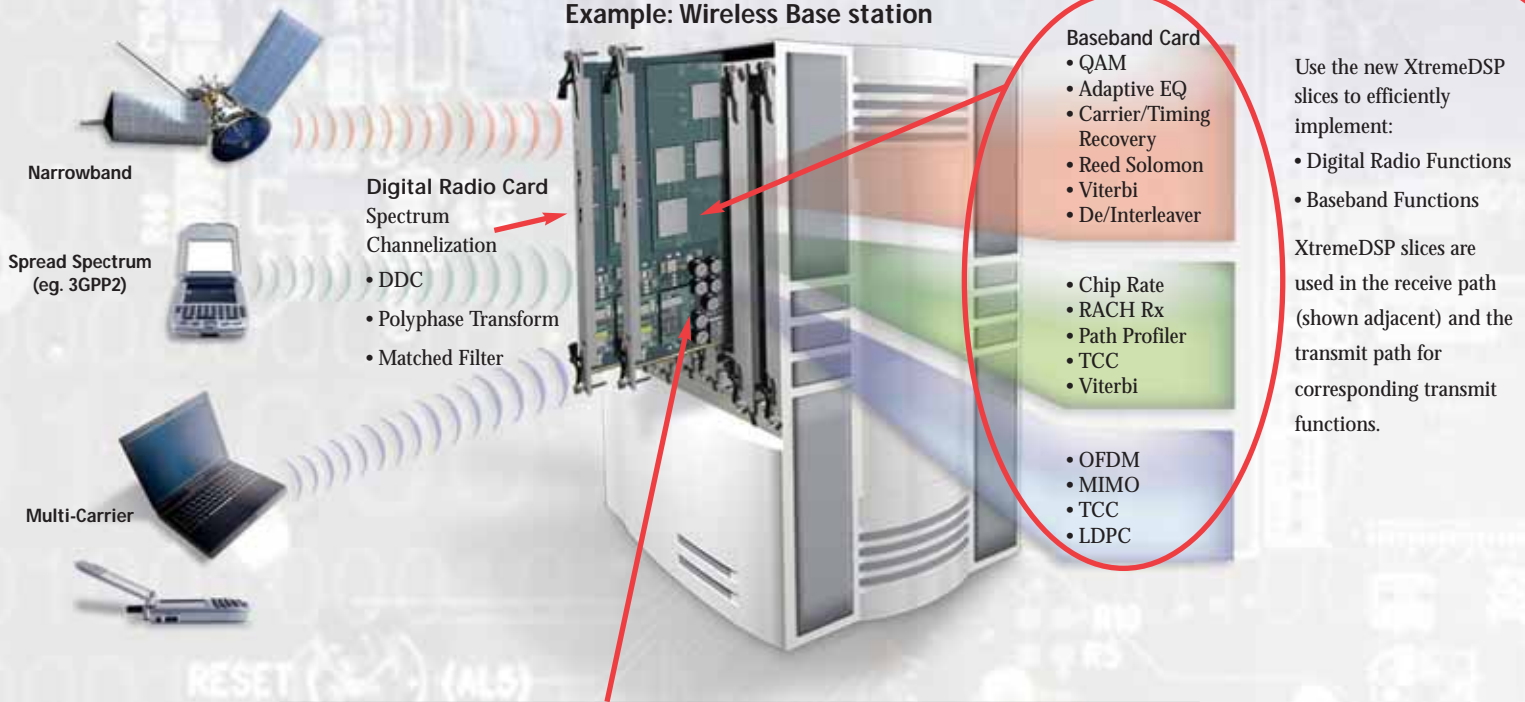
- 500 MHz throughput (256 GMACS overall performance) in 4VSX55
- 40+ arithmetic functions
- 1/7th the power compared to previous-generation FPGAs
- Directly cascadeable without loss in speed



## Digital Communication Systems

Whether you are working with spread-spectrum, multi-carrier, or narrowband communication systems, Virtex-4 FPGAs are the ideal choice.

### Example: Wireless Base station



## Powerful Serial and Parallel Interfaces

**The Challenge:** Need to interface to DSP processors, memory, and other systems

**The Virtex-4 Solution:** Extremely flexible I/O interfaces



### DSP Processors & ADCs and DACs

- Serial RapidIO
- EMIF etc.
- LVDS etc.



### External Memories

- DRAM**
- DDR2, DDR
  - SDRAM, RLDRAM II
  - FCRAMII
- SRAM**
- QDRII, ZBT



### System Interfaces

- Serial RapidIO
- PCI Express
- PCI
- HD-SDI
- Aurora
- CPRI, OBSAI



# -Value FPGA for Signal Processing

## Integrated Hard and Soft Microprocessors

**The Challenge:** Complex control and RTOS implementation.

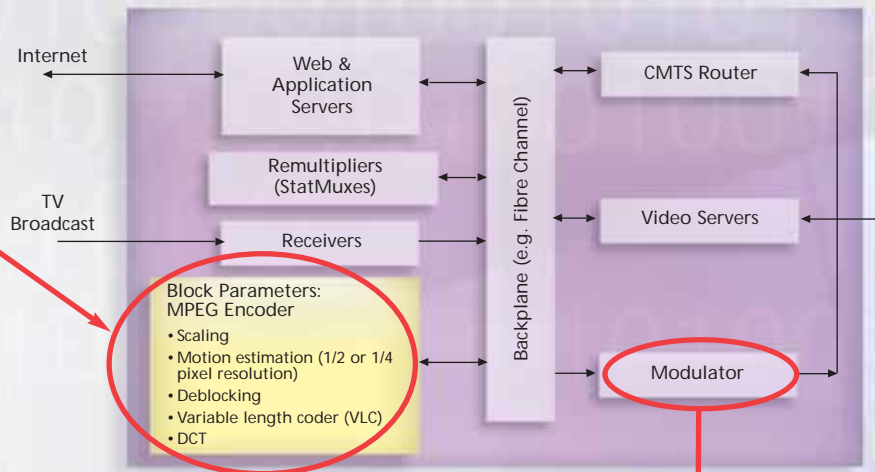
**The Virtex-4 Solution:** A broad selection of 8- to 32-bit microprocessor systems and operating system support (VxWorks, Integrity, Linux, etc.)



- Hard 32-bit IBM PowerPC 405 cores in FX platforms for implementing advanced frameworks such as Software Communications Architectures (SCAs) for software-defined radio applications
- Xilinx PicoBlaze™ and MicroBlaze™ soft microprocessors for control circuits

## Video/Imaging and Broadcast Systems

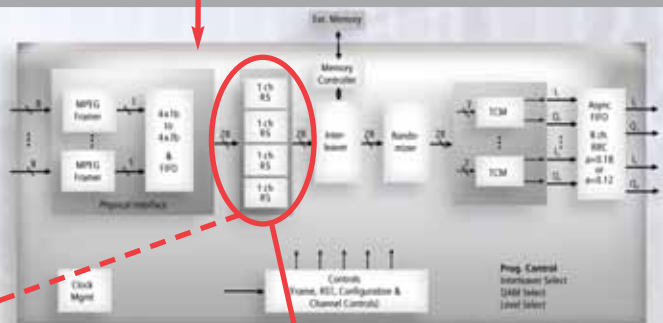
### Example: Cable Head-end System



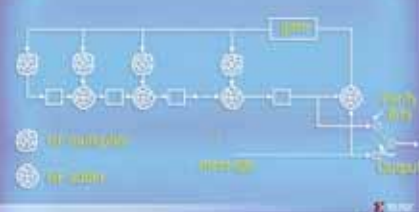
### Compact Multi-Channel Designs using SRL16s

**The Challenge:** Keep cost and power down for multi-channel signal-processing designs

**The Virtex-4 Solution:** Unique SRL16s enable you to achieve very high compute density and make efficient use of logic slices.

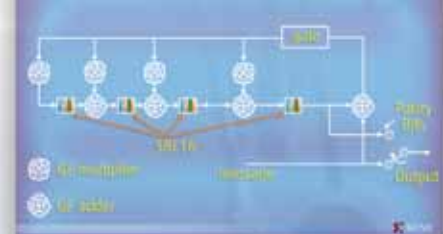


Single-Channel Reed Solomon Encoder Replicated 16 times (without using SRL16s)



Using a single SRL16, a 16-channel Reed-Solomon encoder consumes only 10% of the silicon area compared to a design that simply replicates a single channel version 16 times.

Efficient 16-channel RS-Encoder using a Single SRL16



# Finish Faster with Xilinx DSP Design Solutions

## Xilinx System Generator for DSP

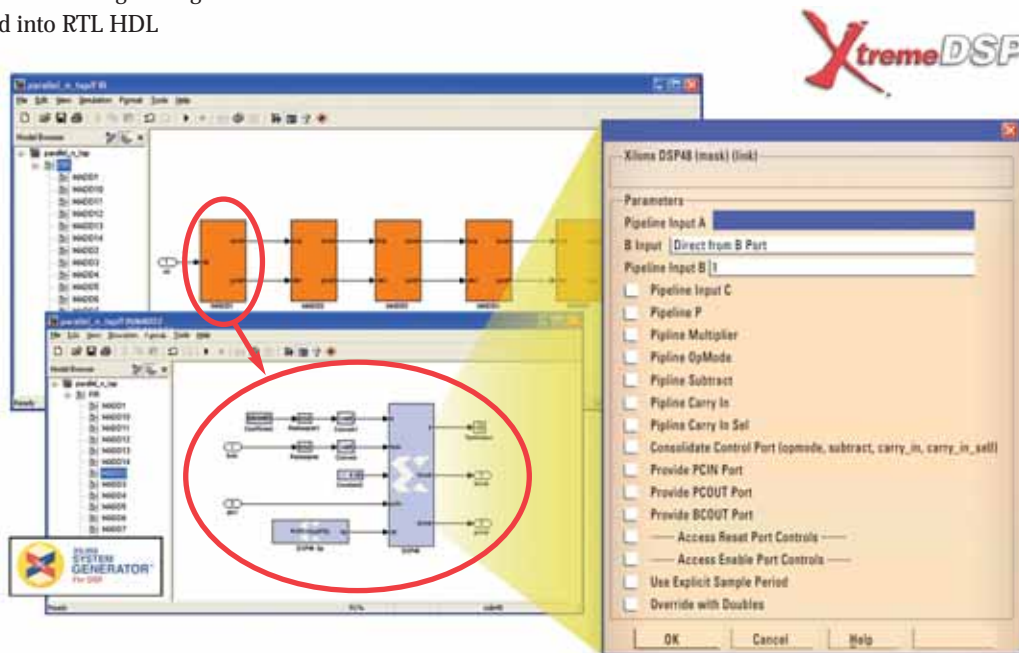
The industry's premier solution for FPGA-based DSP design enables you to:

- Generate high-performance DSP algorithms in FPGAs from a high level executable specification in Simulink®
- Accelerate simulations by orders of magnitude using your target hardware “in the loop” with Simulink or ModelSim®
- Import VHDL and Verilog modules directly into Simulink using a ModelSim co-simulation interface
- Specify state machine and other logic using MATLAB® code that is automatically compiled into RTL HDL

## Pre-verified Signal Processing Algorithms as IP Cores

Xilinx and partners provide a range of DSP IP cores that are optimized for speed and cost.

- FEC: Reed-Solomon, Viterbi, TCCs, and others
- FFTs, Filters, and others
- Math functions: CORDIC, Multiplier, MACs, and others
- Video IP—Compression scaling and others
- Industry-standard DSP connectivity with Serial RapidIO, PCI, and EMIF



## DSP Services and Support for Virtex-4 FPGAs

### DSP Education Services

Reduce your time-to-knowledge with public, private, and online courses including:

- DSP Design Flow (three-day course)
- DSP Implementation Techniques for Xilinx FPGAs (three-day course)

### DSP Support Services

Ensure the success of your DSP project with award-winning technical support, including:

- Industry's best support web site
- Free DSP hotline support
- Platinum DSP hotline support
- Titanium on-site AE support

### DSP Design Services

Reduce your project risk by allowing our engineers to help you with:

- System architecting
- FPGA implementation
- IP core modification
- Turnkey system design

## Take the Next Step

Learn more about achieving blazing DSP performance with unrivalled economy. Visit us online at [www.xilinx.com/virtex4](http://www.xilinx.com/virtex4)

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