# Intel<sup>®</sup> IXP420 Network Processor

## **Product Highlights**

- Member of the IXP4XX network processor product line for residential and small-tomedium enterprise (SME) applications
- Intel® XScale<sup>™</sup> RISC core at 266 MHz provides headroom for customer-defined applications
- Two integrated 10/100 Base-T Ethernet MACs with MII/RMII interface for design flexibility and cost-effective wire-speed performance
- 33/66 MHz PCI v2.2 host and option interface for glueless connection of up to four devices
- SDRAM controller supports from 8 to 256 Mbytes of SDRAM memory
- Low system power consumption (1.0–1.5 Watt typical)
- USB version 1.1 device controller
- Two high-speed UARTS: can support 921 Kbaud each, or one UART at 921 Kbaud and one Console UART at 230 Kbaud
- Sixteen GPIO pins
- 16-bit configurable expansion bus
- Commercial temperature (0° to 70° C)

# **Product Overview**

The Intel® IXP420 network processor, a member of the IXP4XX product line, is a single chip integrated processor that meets the needs of high-performance and cost-sensitive applications ranging from home gateways, small office/ home office (SOHO) routers and wireless access points to industrial control and networked imaging applications.

The Intel IXP420 network processor feature set integrates a 266 MHz Intel XScale RISC core, high-performance PCI interface, USB controller and two 10/100 Ethernet MACs. This network processor enables cost-effective implementations that extend the processing power, low power consumption and flexibility of the Intel<sup>®</sup> IXP425 network processor into targeted market segments.



### Intel in Communications

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#### Common IXP4XX Product Line Architecture for Application Flexibility

All IXP4XX network processors have a unique distributed processing architecture that speeds development for a range of applications. Each processor combines a high-performance Intel XScale core with additional Network Processor Engines (NPEs) to achieve wire-speed packet processing performance.

The Intel XScale core and the NPEs run their instruction streams in parallel. The Intel XScale core is fully compatible with ARM\* V5T Thumb instructions set and V5E DSP extensions. Designed on the Intel<sup>®</sup> 0.18-micron process technology, the Intel XScale core delivers a high MIPS/power consumption ratio and provides ample processing headroom for value-added software features.

The two NPEs in the Intel IXP420 network processor are designed to complement the Intel XScale core for many computationally intensive data plane operations. These tasks include: IP header inspection and modification, packet filtering, packet error checking, checksum computation and flag insertion and removal. The NPE architecture includes an ALU, self-contained internal data memory and an extensive list of I/O interfaces, together with hardware acceleration elements. The hardware acceleration elements associated with an NPE targets a set of networking applications. Each hardware acceleration element is designed to increase the speed of a specific networking task that would otherwise take many MIPS to complete by a stand alone RISC processor.

Both Ethernet NPE A and the Ethernet NPE B include an MII/RMII interface. Either Ethernet NPE is capable of handling 100 Mbps full-duplex Ethernet packet filtering. The extensive hardware capabilities of the NPEs are under the control of microcoded algorithms that are accessed via application programming interfaces (APIs) released as a software library with the processor. Customer applications configure and interact with the NPEs through the high-performance API layer running on the Intel XScale core. Sample "codelets" are included that demonstrate how to use each service or function provided by the Intel XScale core library and the underlying hardware.



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# Highly-integrated Data Functionality and LAN/WAN Capabilities

On-chip integration of data functions saves the cost of implementing separate devices. In addition to the two 10/100 Base-T Ethernet MACs with MII/RMII interface and simultaneous full-duplex operation, the processor integrates an SDRAM controller and peripheral functions including an interrupt controller, GPIO port, UART, watchdog timer and general-purpose timers. The processor includes a USB version 1.1-device controller, and the PCI 2.2 host and option interface provides the flexibility to directly connect devices including 802.11x chips, PCMCIA controllers, Ethernet MACs and cable MAC/PHYs.

#### Tools, Applications and Operating Systems Support Rapid Development

Intel XScale technology includes a broad range of development tools and applications, together with support for multiple operating systems. The Intel IXP420 network processor currently supports Wind River\* VxWorks\* and the standard Linux\* kernel. Associated third-party products are available for the IXP4XX product line including Wind River Tornado\* for VxWorks and the MontaVista\* Linux Professional Edition. Multiple third-party vendors also provide application stacks and advanced development environment support.

To help speed time-to-market and reduce development costs, developers have a wide choice of Intel XScale technology-based tools. The Intel IXP420 network processor may be controlled during debug through a JTAG interface to the processor. The Macraigor\* Raven\*, Wind River Systems visionPROBE\*/ visionICE\* and EPI\* MAJIC\* systems will plug into the JTAG interface through a 20-pin connector.

#### Development Platform for Faster Time-to-Market

The Intel<sup>®</sup> IXDP425 Network Processor Development Platform is a powerful tool for development and verification of hardware and software for the IXP4XX product line. Using a common development platform across the product line helps reduce costs and speeds development by providing a consistent tools/development environment. Developers can use this flexible and extendable platform to conduct rapid initial chip evaluation, chip performance evaluation, product development and prototyping. Pin compatibility among members of the IXP4XX product line further reduces hardware design complexity.

The development platform hardware includes a base card with the Intel IXP425 network processor at 533 MHz, and four flexible I/O cards. The four I/O cards consist of two Intel® LXT972 LAN PHY expansion cards, one ADSL PHY expansion card and one voltage regulator expansion card.

#### Intel® Internet Exchange Architecture

The Intel IXP420 network processor is part of Intel<sup>®</sup> Internet Exchange Architecture (Intel<sup>®</sup> IXA), a packet processing architecture that provides a foundation for software portability across multiple generations of network processors. Intel IXA is based on Intel XScale technology, the Intel IXA portability framework and programmable microengines.

#### **Intel Advantage**

Intel is a leading supplier of communications building blocks, adding value at many levels of integration. Through continuous innovations and advancements in connectivity and processing in the network, Intel is delivering, along with its customers and developer community, a wide choice of solutions that enable faster time-to-market, longer time-in-market, and increased revenue opportunity.

# **Product Ordering Information**

Item	Order Number
Intel® IXP420 Network Processor	FWIXP420BB
Intel® IXP421 Network Processor	FWIXP421BB
Intel® IXP422 Network Processor	FWIXP422BB
Intel® IXP425 Network Processor, 266 MHz	FWIXP425BB
Intel® IXP425 Network Processor, 400 MHz	FWIXP425BC
Intel® IXP425 Network Processor, 533 MHz	FWIXP425BD
Intel® IXP425 Network Processor, 266 MHz Extended Temperature	GWIXP425BBT
Intel® IXP425 Network Processor, 400 MHz Extended Temperature	GWIXP425BCT
Intel® IXP425 Network Processor, 533 MHz Extended Temperature	GWIXP425BDT
Intel® IXDP425 Network Processor Development Platform	KIXDP425BD
Intel® IXP4XX Network Processor Product Line Literature	Order Number
Intel® IXP425 Network Processor Product Brief	279051-003

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Intel® IXDP425 Network Processor Development Platform Product Brief	279052-001
Intel® IXP420 Network Processor Product Brief	252494-002
Intel® IXP421 Network Processor Product Brief	252495-002
Intel® IXP422 Network Processor Product Brief	252496-002

#### Please contact your Intel Representative for the following documents:

Intel® IXP4XX Product Line Datasheet	
Intel® IXP4XX Product Line Developer's Manual	
Intel® IXP4XX Product Line Programmer's Guide	

#### **Intel Access**

Communications Processing Web page	http://www.intel.com/go/commsprocessing
Intel® Network Processors Web page	http://developer.intel.com/design/network/products/npfamily/
Intel in Communications	http://intel.com/communications/
Other Intel Support:	
Intel® Technical Documentation Center	http://intel.com/go/techdoc (800) 548-4725 7 a.m. to 7 p.m. CST (U.S. and Canada) International locations please contact your local sales office
General Information Hotline	(800) 628-8686 or (916) 356-3104 5 a.m. to 5 p.m. PST

#### For more information, visit the Intel Web site at: developer.intel.com

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