



Intel® IXP460 Network Processor

Ideal for communications and embedded networking applications

Product Highlights

- Member of Intel® IXP46X product line of network processors for small-to-medium enterprise (SME) communications and embedded networking applications
- Intel XScale® core speeds of up to 667 MHz provides scalable processing headroom for target applications
- Integrated support for time synchronization and ECC memory improves performance and reliability
- Consistent Intel® IXP4XX product line software and hardware architecture protects customers' development investments and speeds deployment of a standards-based product portfolio
- Robust development environment minimizes time-to-market

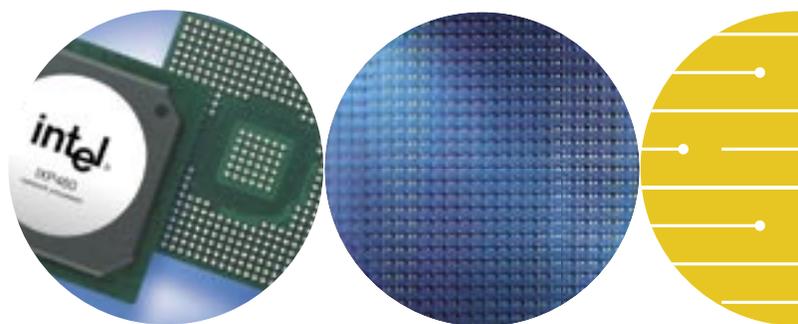
Product Overview

The Intel® IXP460 network processor is a member of the Intel IXP46X product line for SME communications and embedded networking applications. The Intel IXP460 is an addition to the Intel IXP4XX product line of network pro-

cessors, and extends Intel XScale technology into a broad range of applications that require communications functionality. The consistency of the Intel IXP4XX product line software and hardware architecture protects customers' development investments and speeds development of a standards-based product portfolio.

The highly integrated, single-chip design of the IXP460 network processor provides a unique combination of performance, reliability and flexibility. The IXP460 network processor combines Intel XScale technology with a variety of built-in communications features to support requirements for routers, networking gateways, industrial control and automation applications, interactive clients, test and instrumentation, RFID readers, and networked print imaging applications. The high-performance Intel XScale core provides processing headroom to flexibly support a broad range of OEM applications while minimizing power consumption. Integration of multiple 10/100 Ethernet interfaces and built-in hardware acceleration for time synchronization reduces overall system cost and simplifies development.

www.intel.com/go/networkprocessors



The Intel® IXP460 network processor is supported by a similar robust application development environment for the Intel® IXP4XX product line including pre-integrated and pre-validated development infrastructures and operating systems, development platforms, software components, and debug tools from Intel, members of the Intel® Communications Alliance and other third-party providers.

Consistent Intel® IXP4XX Product Line Architecture for Application Flexibility and Ease of Development

The Intel IXP460 network processor shares a common architecture with the rest of the IXP4XX product line. This unique distributed processing architecture 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 processor performance. The Intel XScale core and the NPEs run their instruction

streams in parallel. The Intel XScale core is compliant with Intel® StrongARM® Version 5TE. Designed using Intel® 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 IXP460 network processor are designed to complement the Intel XScale core for many computationally intensive data plane operations. These data plane operations 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 instruction and data memories, and an extensive list of I/O interfaces, together with hardware acceleration elements. The hardware acceleration elements associated with each NPE target 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.

Each NPE can support Layer 2 and, in some cases, Layer 3 packet classification and processing. A 10/100 Ethernet interface is attached to each NPE. Each 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” demonstrate how to use each service or function provided by the Intel XScale core library and the underlying hardware.

Highly Integrated Design Lowers System Cost

On-chip integration of a wide variety of functions and commonly used interfaces saves the cost of implementing separate devices and enables easier integration with other hardware. The Intel XScale core includes integrated multiply and accumulate

functions that support multimedia processing without the need for external hardware. The Intel® IXP460 network processor solution includes a floating point library, a powerful DSP software library, and robust general and multimedia signal processing kernels optimized for maximum performance on the Intel XScale core.

To further reduce total chip count, the processor includes an integrated DDR1-266 SDRAM controller with ECC support, interrupt controller, GPIO port, UARTs, watchdog timer, and general-purpose timers. The processor features a USB version 1.1-device controller and a USB 2.0 low-speed and full-speed compatible host-only controller. Peripheral devices can be directly connected through a 32-bit expansion bus interface that supports external mastering capability and optional byte-wide parity configuration. The PCI 2.2 host and option interface provides the flexibility to directly connect a variety of devices including 802.11x chips, PCMCIA controllers, and cable MACs/PHYs.

Value-Added Features for Embedded Applications

The Intel® IXP460 network processor includes several features to enable embedded networking applications. The IXP460 network processor integrates hardware assist logic for time synchronization of multiple clocks in a distributed control system. This hardware assist logic along with software running on the Intel XScale® core can be used to implement full source or sink capable IEEE 1588* compliant network node. ECC support on the DDR1-266 controller and parity on almost all internal memories and spread spectrum clocking provide enhanced system reliability. Low power dissipation along with support for extended temperature eliminates the need for fans and allows for small-form factor designs.

Operating Systems, Tools and Applications Support Rapid Development

The Intel® IXP400 software solution provides a common software framework for the IXP460 network processor and the Intel® IXP465 network processor as well as the Intel® IXP42X product line of network processors. The IXP460 network processor-based solutions build on the current IXP42X-based ecosystem and code investment, providing customers with a broad range of development tools and applications, together with support for multiple operating systems:

- Intel® IXP400 Software v2.0
- Intel® IXP400 DSP Software
- Intel® IXP400 Software Floating Point Library v2.0
- MontaVista* Linux Professional Edition 3.1

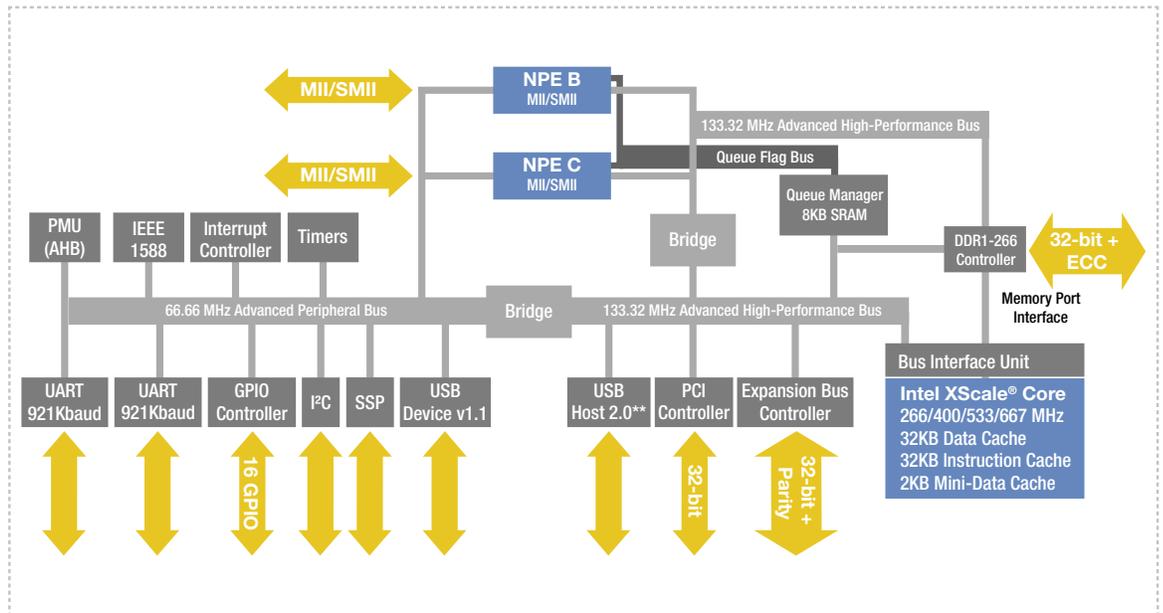


Figure 1: Intel® IXP460 Network Processor Block Diagram

** USB 2.0 Host supports low-speed (1.5 Mbps) and full-speed (12 Mbps) modes.

- Wind River* VxWorks* Developers Toolkit (VDT) 2.2.1
- Wind River Platform for Network Equipment (PNE) 2.1
- Red Hat* RedBoot* and Tool Chain v2.0

Intel® IXDP465 Development Platform for Faster Time-to-Market

The Intel® IXDP465 development platform is a powerful tool for development and verification of hardware and software for the Intel IXP460 network processor. Developers can use this flexible and extendable platform to conduct rapid initial chip assessment, performance evaluation, prototyping and product development. See Figure 2 for diagram of development platform. Key features of the development platform are:

- 533 MHz Intel® IXP465 network processor-based CPU subsystem with DDR1-266 SDRAM and JTAG connector
- Two USB connectors (one host, one device)
- Four PCI host slots
- One PCI option connector
- Two UART connectors
- I²C EEPROM
- 32 MB Intel StrataFlash®
- Six 10/100 Mb Ethernet ports (via RJ45)**
- LCD display
- Power supply
- One Ethernet MII** module
- Optional modules:
 - HSS** analog (4-FXS, 1-FXO) voice module
 - HSS** quad T1/E1 module
 - One ADSL or UTOPIA-2** module
 - Two additional Ethernet MII** modules

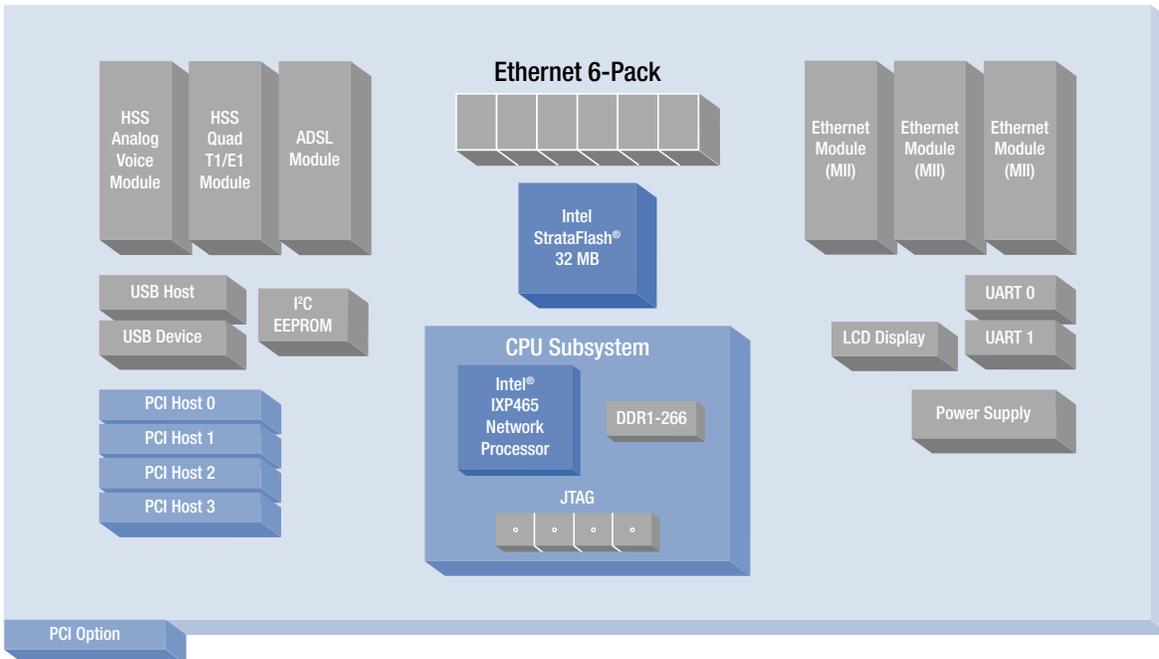


Figure 2: Intel® IXDP465 Development Platform Block Diagram

** Requires Intel® IXP400 software.

| Features | Benefits |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Intel XScale® core <ul style="list-style-type: none"> • Available at 266 MHz, 400 MHz, 533 MHz and 667 MHz | Delivers high MIPS/power consumption ratio and provides ample processing headroom for value-added software features |
| 32-bit 33/66 MHz PCI v2.2, host and option interface | Provides flexibility to directly connect devices including 802.11x chips, PCMCIA controllers and cable MACs/PHYs |
| USB <ul style="list-style-type: none"> • USB v. 1.1 device controller • USB v. 2.0 host controller, supports low-speed and full-speed modes | Industry-standard interface for connection to a wide array of devices |
| 32-bit, DDR1 -266 Controller <ul style="list-style-type: none"> • Optional ECC • 32MByte to 1GByte of memory | <ul style="list-style-type: none"> • High-bandwidth memory interface • Optional ECC improves system reliability |
| 32-bit Expansion bus interface with parity <ul style="list-style-type: none"> • Master/Target capable • 25-bit address | <ul style="list-style-type: none"> • Glueless connection to most other devices • External mastering capability allows external devices to communicate with each other and with internal peripherals resulting in shared memory subsystem design and lower system cost |
| Up to two integrated 10/100 Ethernet MACs with MII/SMII interface | Integrated industry standard LAN/WAN interface lowers system bill of materials (BOM) cost |
| Hardware support for IEEE1588 protocol | Hardware assistance for Time Synchronization in a distributed control system containing multiple clocks |
| Two high-speed UARTs support up to 921Kbaud each | Provides an interfaces for debug and passing control information |
| Integrated I ² C and SSP interfaces | Provides serial interfaces for common embedded and communications application; reduces system BOM cost |
| Spread spectrum clocking | Improves system reliability by reducing EMI |
| Comprehensive pre-validated pre-integrated “out-of-the-box” development infrastructures ready for application development using Linux* or VxWorks* | Ease of design and fast time-to-market |
| 544-Ball PBGA Package <ul style="list-style-type: none"> • 35mm x 35mm, 1.27mm ball pitch • Lead-free packages available • Commercial temperature (0° to 70° C) • Extended temperature (-40° to 85° C) | <ul style="list-style-type: none"> • High-performance package provides improved reliability • Lead-free packages help to meet environmental regulations • Extended temperature support for industrial control and automation applications |

Intel® Communications Alliance

With Intel development platforms, developers can design comprehensive systems combining products from Intel and third-party vendors to accelerate time-to-market and reduce development costs. For more information on third parties in the Intel® Communications Alliance who support Intel network processors and their development environment, visit: www.intel.com/go/ica

Intel Access

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| Intel® Network Processors Web page | www.intel.com/go/networkprocessors |
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| Intel® Technical Document 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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