



## Wireless Access Point Solutions

# Intel® IXP4XX Network Processor Product Line

Wireless LAN (WLAN) solutions provide mobile professionals with the flexibility to access data and productivity tools while they are away from their desks. In addition to deployments at large enterprise and small-to-medium enterprise (SME) sites, a growing base of users is implementing home wireless LANs and accessing WLAN hotspots and services at airports, hotels, coffee shops and other public venues. In all of these areas, the WLAN enables users to access e-mail, review documents, collaborate with co-workers, access corporate intranets, transfer files and browse Web sites.

The wireless access point provides the point of connection between wireless LANs and a wired network. The availability of multiple wireless access points in corporate facilities provides mobile workers the freedom to roam, while preserving a continuous wireless connection between their laptop PCs or wireless-enabled PDAs and the network.

As they begin to recognize the time-savings, freedom, mobility and convenience of wireless LAN technology, today's enterprise users and IT departments will naturally expect the same degree of security, reliability and performance provided by familiar wired Ethernet networks. Satisfying these demands requires manufacturers of wireless access point devices to meet a demanding new set of design challenges.

### New Challenges: Security, Performance, Manageability and Cost

Whether they are deployed in public hotspots, SME or enterprise sites, wireless access points must be secure, manageable, scalable, and cost-effective. The wireless LAN market segment is growing rapidly, and as the technology matures, users place greater importance on wire-speed performance and increased security. However, as various 802.11x protocols become the predominant method of wireless LAN connectivity, conventional wireless access point designs are reaching their performance limits.

To implement these capabilities, wireless access point manufacturers typically choose either a two-tiered or distributed network architecture:

- In the two-tiered model, wireless access points provide basic connectivity, but support limited features. Individual wireless access points are aggregated to an intelligent access point controller or a switch responsible for security and other network services.
- In the distributed model, intelligent services are deployed closer to the user, eliminating the need for a separate control layer. In this approach, each wireless access point is capable of supporting a significantly broader range of services such as security and management and usually provides dual-band capabilities.

Going forward, access point designs will require scalable processing performance to support the addition of the new features in software that help differentiate an "enterprise-class" device. This is increasingly true with the maturation of 802.11x wireless Ethernet standards, such as 802.11e Quality of Service, 802.11i Security, 802.11f Inter Access Point Protocol and 802.11h DFS/TPC.

The Intel® IXP4XX product line enables developers to put intelligence where it is required, with the processing performance needed to support the emergence of new feature sets and wireless protocols. This flexibility helps developers create the optimum balance of features and price points.

### Solution: the Highly Integrated Intel® IXP422 Network Processor

The Intel® IXP422 network processor is being selected by manufacturers for a variety of new wireless access point designs. The IXP422 includes a high-performance Intel® XScale™ RISC core with two programmed network processor engines (NPEs). Each NPE is a multithreaded processor engine implemented in hardware with separate instruction/data memory for fast local code and data store. Each 10/100 Ethernet NPE features an MII/RMII interface and is capable of handling Layer 2 packet filtering at up to 100 Mbps in full duplex mode. A notable feature of the IXP422 is a dedicated hardware acceleration element for IPsec cryptography and authentication functions including SHA-1, MD5, DES, 3DES and AES algorithms. By accelerating processor-intensive packet handling tasks, the NPEs enable rapid, efficient execution of application code. The unique distributed processing architecture helps meet growing performance requirements of enterprise-class wireless access points, while providing the application-processing headroom needed for new software-based functionality in future generations of products.

## Integrated Hardware Architecture Minimizes Costs

The IXP422 includes a high-performance PCI interface, USB controller, and two 10/100 Ethernet MACs. The PCI interface enables wireless access point manufacturers to expand product capabilities by connecting multiple 802.11x devices, PCMCIA controllers, Ethernet MACs and broadband MAC/PHY devices. The processor also features an expansion bus that provides a glueless interface to flash memory devices and other peripherals.

## Flexible Software Architecture for Faster Time-to-Market

The Intel XScale core implements the ARM® V5 integer instruction set architecture, including ARM V5T Thumb instructions and ARM V5E DSP extensions. Software applications interact with the NPEs through a high-performance API layer that runs on the core. The Intel® IXP4XX Software Library is a collection of software components optimized for the IXP4XX product line. The IXP4XX Software Library includes executable instruction files that implement NPE functionality and optimize processing performance. All library components are written in ANSI-C, and there are no direct calls to any other OS library functions. This makes the software library compatible with multiple operating systems.

## Tools for Easier Development

The IXP422 network processor currently supports Linux® and Wind River® VxWorks® and is compatible with multiple real-time and embedded operating systems. Developers can also select from a variety of software and hardware development tools such as JTAG debuggers, board support packages and development environments.

The IXP422 is also supported by the Intel® IXDP425 Network Processor Development Platform, a powerful tool for developing hardware and software for processors in the Intel IXP4XX product line. Together with the operating system and tools, the Intel IXDP425 platform provides a total development environment for the IXP422.

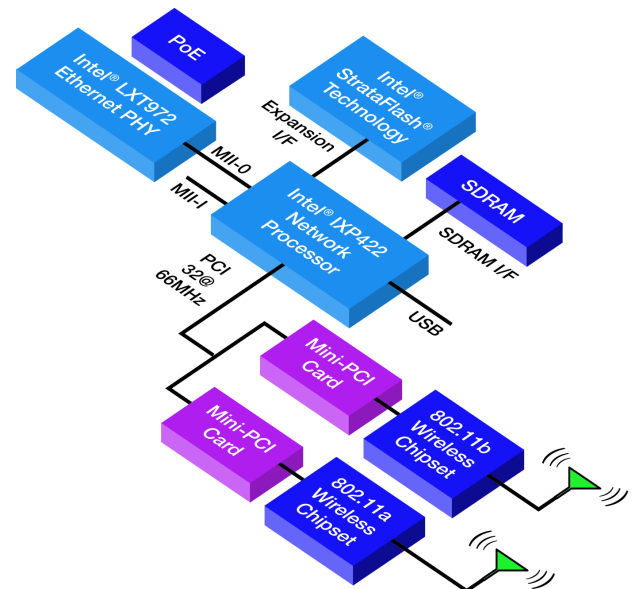
## Scalable Intel® IXP4XX Network Processors

The IXP422 network processor is a member of the Intel IXP4XX network processor product line, a set of highly integrated products that can be used in a variety of applications that require a combination of network connectivity, integrated functionality and high performance. With their distributed processing architecture and integrated support for multiple WAN and LAN technologies, Intel IXP4XX network processors provide the development benefits of a common architecture and a pin-compatible footprint, while delivering wire-speed performance that enables manufacturers to add a variety of rich software services.

The consistent architecture and broad range of features available in the IXP4XX product line simplify the task of choosing a processor to enable wireless applications. For example, the IXP420 provides a highly cost-effective platform for two-tier access point configurations, while the Intel IXP422 is an ideal solution for deploying additional services such as security. The full-featured IXP425 network processor, with its range of core frequencies (up to 533 MHz) in both commercial and extended temperature versions, offers sufficient processing headroom to enable high-performance services for the most demanding wireless access point applications.

## 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.



**Intel® IXP422 Network Processor in a Wireless Access Point Application**

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### UNITED STATES AND CANADA

Intel Corporation  
Robert Noyce Bldg.  
2200 Mission College Blvd.  
P.O. Box 58119  
Santa Clara, CA 95052-8119  
USA

### EUROPE

Intel Corporation (UK) Ltd.  
Pipers Way  
Swindon  
Wiltshire SN3 1RJ  
UK

### ASIA-PACIFIC

Intel Semiconductor Ltd.  
32/F Two Pacific Place  
88 Queensway, Central  
Hong Kong, SAR

### JAPAN

Intel Japan (Tsukuba HQ)  
5-6  
Tokodai Tsukuba-shi  
300-2635 Ibaraki-ken  
Japan

### SOUTH AMERICA

Intel Semicondutores do Brasil LTDA  
Av. Dr. Chucuri Zaidan, 940-10<sup>o</sup> andar  
04583-904 São Paulo, SP  
Brazil

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