

## **Freescale Introduces QorIQ P4080 Highly Advanced Eight-Core Communications Processor**

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### **QorIQ P4080 Communications Processor**

Freescale Semiconductor introduces the QorIQ P4080 multicore processor – a highly advanced eight-core communications processor designed to set new standards for performance, power efficiency and programmability in the embedded multicore space. The signature member of Freescale's new QorIQ product line, the P4080 multicore processor is based on 45-nm process technology. It integrates enhanced Power Architecture<sup>™</sup> cores, a tri-level cache hierarchy, innovative CoreNet<sup>™</sup> on-chip fabric and datapath acceleration to deliver exceptional performance within a 30W maximum power envelope.

“Our new QorIQ P4080 processor addresses the need to dramatically scale performance without introducing complexity for developers,” said Lynelle McKay, senior vice president and general manager for Freescale's Networking and Multimedia Group. “We've thought through the issues of first-generation multicore devices and the P4080 is our conclusion. By offering breakthrough technology and engaging deeply with our partners, we're ensuring that our customers have what they need to take full advantage of all that our architecture has to offer.”

The QorIQ P4080 provides concurrent handling of control-plane, data-plane and application layer processing tasks. It is ideal for applications such as switches, enterprise and service provider routers, access and media gateways, base station controllers, radio network controllers (RNCs), and general-purpose embedded computing systems in the networking, telecom, industrial, military and aerospace markets.

“Multicore communications processors are well positioned to address a huge challenge facing networks today – managing the increasing complexity and convergence of traffic created by the demand for feature-rich, bandwidth-intensive services,” said Aileen Arcilla, senior networking, broadband and storage analyst for IDC. “The potential of a multicore device to integrate control-plane, data-plane and applications processing tasks onto a single chip while optimizing performance at low power levels will drive the growth of the embedded multicore market.”

## **Architectural keys to exceptional performance**

The P4080 SoC features eight enhanced Power Architecture® e500mc cores that target a top frequency of 1.5 GHz. Each core has its own dedicated 128KB L2 backside cache and access to 2MB of shared frontside L3 cache. **Full processor independence**, including the ability to boot and reset each individual e500mc core, is a defining characteristic of the device. The cores can work as eight symmetric multiprocessing (SMP) cores, as eight completely asymmetric multiprocessing (AMP) cores, or they can be operated with varying degrees of independence with a combination of SMP and AMP groupings. In addition, the ability of the cores to run different operating systems (OSes), or run OS-less, provides the user with significant flexibility in partitioning between control, datapath and applications processing.

Overall performance is enhanced via a Datapath Acceleration Architecture (DPAA) that simultaneously provides high networking performance and reduces software complexity. The acceleration architecture works in concert with the cores to manage packet routing, security, quality-of-service and deep packet inspection – freeing the cores to focus on value-added services and application processing. The CoreNet fabric also boosts performance by eliminating bus contention, bottlenecks and latency issues associated with shared bus/shared memory architectures that are common in other multicore approaches.

The QorIQ P4080 features an impressive array of high-speed I/O technologies including dual 10-Gbps Ethernet (XAUI) controllers, eight 1-Gbps Ethernet (SGMII) controllers, three PCI Express v2.0 controllers/ports running at up to 5GHz and two serial RapidIO® 1.2 controllers/ports running at up to 3.125GHz. Addressing development in the embedded multicore era

To speed application development and enable new levels of visibility into the multicore device, Freescale has partnered with simulation software firm Virtutech to create a first-of-its-kind hybrid simulation environment. This environment combines Virtutech's Simics[tm] simulator's fast-functional mode with a detailed performance mode for the QorIQ P4080 processor platform. Even prior to first silicon, developers have a simulation environment where everything is deterministic, everything can be seen, and everything can be controlled – all without real-world hardware constraints. Using the hybrid model, developers may partition cores and code, performing 'what if' scenarios. They may deploy and bring up operating systems, as well as develop, debug and test software. The environment also allows software developers to performance tune their drivers, middleware and application code.

In addition, Freescale has engineered capabilities into the QorIQ P4080 to enable advanced debugging while working in tandem with ecosystem partners to assure availability of tools that can take advantage of these features. These capabilities include Aurora-based high speed trace, Nexus trace, integrated instruction trace, watchpoint triggers, cross-event triggers, performance monitoring and other debug features as defined by the Power ISA. The features

enable dynamic debug essential for maximum visibility into complex interactions that may occur among tasks running on different cores.

The QorIQ P4080 also offers a new level of hardware partitioning through an embedded hypervisor designed to allow system developers to ensure software running on any CPU only accesses the resources (memory, peripherals, etc.) that it is explicitly authorized to access. The embedded hypervisor simplifies development by hiding elements of the physical characteristics of computing resources. It helps to enable safe and autonomous operation of multiple individual operating systems, allowing them to share system resources, including processor cores, memory and other on-chip functions. The hypervisor also includes distributed peripheral access management units which provide address translation and access control for all bus masters in the system.

About QorIQ communications platforms

Freescale QorIQ communications platforms are the next-generation evolution of Freescale's leading PowerQUICC® communications processors. Built using high-performance Power Architecture cores, Freescale QorIQ platforms enable a new era of networking innovation where the reliability, security and quality of service for every connection matters. The Freescale QorIQ platforms and roadmap consist of five platforms (P1, P2, P3, P4 and P5) that include single-, dual- and many cores to offer customers a choice of solutions, whether they are ready to move to multicore today or want a smart migration path to get there in the future.

### **Availability**

A hybrid simulation model of the QorIQ[tm] P4080 device is being demonstrated at this week's Freescale Technology Forum and is scheduled for availability from Virtutech later this year. **The QorIQ[tm] P4080 processor is scheduled to begin sampling in mid-2009.**

### **About Freescale Semiconductor**

Freescale Semiconductor is a global leader in the design and manufacture of embedded semiconductors for the automotive, consumer, industrial, networking and wireless markets. The privately held company is based in Austin, Texas, and has design, research and development, manufacturing or sales operations in more than 30 countries. Freescale is one of the world's largest semiconductor companies with 2007 sales of \$5.7 billion (USD).

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More information about QorIQ P4080 can be found at Freescale website