QorIQ P5040 and P5021 communications processors

Overview
The QorIQ P5 family delivers scalable 64-bit processing with single-, dual- and quad-core devices. With frequencies scaling up to 2.2 GHz, a tightly coupled cache hierarchy for low latency, and integrated hardware acceleration, the P5040 (quad-core) and P5021 (dual-core) devices are ideally suited for compute intensive, power-conscious control plane applications.

Target Markets and Applications
The P5040 processor is designed for high-performance, power-constrained control plane applications. The P5040 processor provides an ideal combination of core performance, integrated accelerators and advanced I/O required for the following compute-intensive applications:

- Enterprise equipment: Router, switch, services
- Data center: Server appliance, SAN storage controller, iSCSI controller, FCoE bridging
- Aerospace and defense
- Industrial computing: Single-board computers, test/measurement, robotics

e5500 Core
The P5040 is based on the 64-bit e5500 Power Architecture® core. The e5500 core uses a seven-stage pipeline for low latency response to unpredictable code execution paths, boosting its single-threaded performance. Key features:

- Supports up to 2.2 GHz core frequencies
- Tightly coupled low latency cache hierarchy: 32 KB I/D (L1), 512 KB L2 per core
- Up to 2 MB of shared platform cache (L3)
- 3 DMIPS/MHz per core
- Up to 64 GB of addressable memory space
- Hybrid 32-bit mode to support legacy software and seamless transition to 64-bit architecture

Virtualization
The P5040 processor includes support for hardware-assisted virtualization. The e5500 core offers an extra core privilege level (hypervisor). Virtualization software for the P5 family includes kernel-based virtual machine, Linux® containers, Freescale hypervisor and commercial virtualization software from Green Hills® Software and Enea®.

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**Data Path Acceleration Architecture (DPAA)**

The P5040 processor integrates QorIQ DPAA, an innovative multicore infrastructure for scheduling work to cores (physical and virtual), hardware accelerators and network interfaces. The FMAN, a primary element of the DPAA, parses headers from incoming packets and classifies and selects data buffers with optional policing and congestion management. The FMAN passes its work to the QMAN, which assigns it to cores or accelerators with a multilevel scheduling hierarchy. The P5040 processor also offers accelerators for cryptography and RAID5/6 offload.
System Peripherals and Networking
For networking, there are dual FMANs with dual 10 Gb/s and 10x 1 Gb/s MAC controllers that connect to PHYs, switches and backplanes over RGMII, SGMII and XAUI. High-speed system expansion is supported through three PCI Express v2.0 controllers that support a variety of lane widths. Other peripherals include SATA, SD/MMC, I²C, UART, SPI, NOR/NAND controller, GPIO and dual 1600 MT/s DDR3/3L controllers.

Software and Tool Support
• Enea: Real-time operating system support and virtualization software
• Green Hills: Comprehensive portfolio of software and hardware development tools, trace tools, real-time operating systems and virtualization software
• Mentor Graphics®: Commercial-grade Linux solution
• QNX®: Real-time OS and development tool support
• QorIQ P5040 development system (P5040DS) available
• QorIQ P5040 reference design board (P5040RDB) available

For more information, please visit freescale.com/QorIQ

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