# MPC8540 PowerQUICC™ III Processor

Overview

Addressing the need for higher compute density and lower system cost, the Freescale MPC8540 PowerQUICC™ III integrated communications processor, built on Power Architecture™ technology, is designed to provide an exceptionally high level of performance and integration. Balancing processor performance with I/O system throughput, the MPC8540 is a powerful control element for network routers and switches, storage subsystems, telecommunications systems and imaging devices.

Innovative Technology

The MPC8540 processor integrates two 10/100/1000 Ethernet controllers (with support for jumbo frames), a 10/100 Ethernet controller, a 64-bit PCI/PCI-X controller operating at up to 133 MHz, an 8-bit 500 MHz parallel RapidIO® controller, a DDR memory controller, a four-channel DMA, a multi-channel interrupt controller and a DUART serial interface. Its high level of integration means simplified board design, low power consumption and a fast time to market solution for customers.

The MPC8540 integrates the e500 core, 256 KB of on-chip L2 cache and the revolutionary on-chip, non-blocking, crossbar switch fabric on-chip network (OCeaN), allowing for full duplex port connections and independent per-port transaction queuing and flow control.

MPC8540 Block Diagram
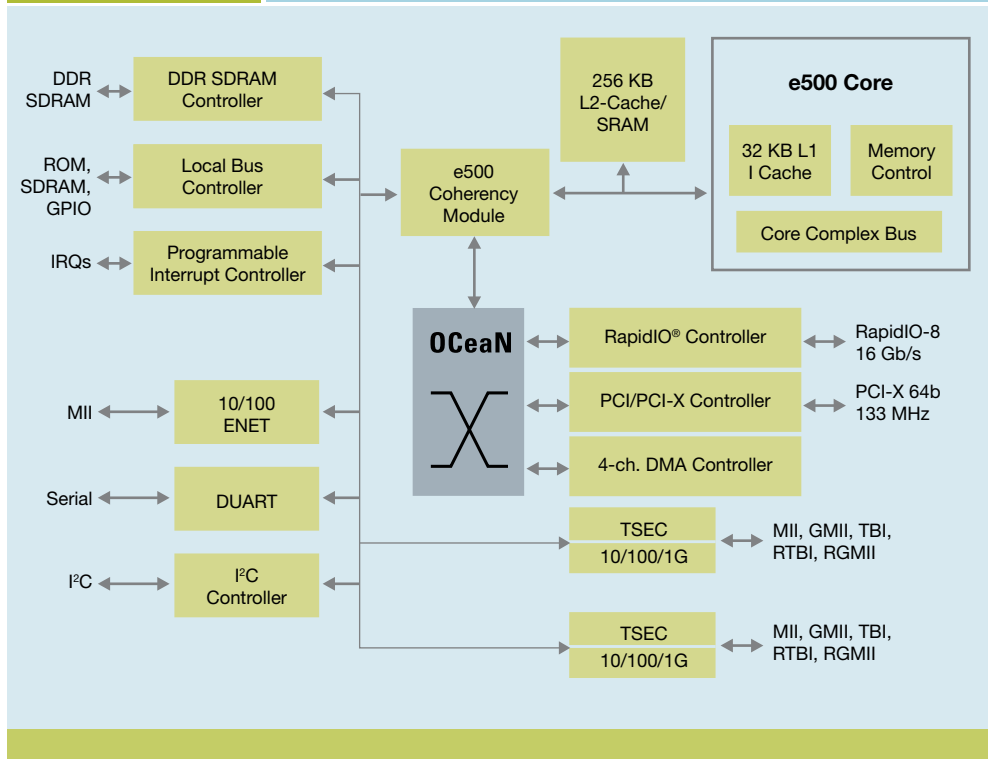
Platform Architecture

Using a system-on-chip (SoC) platform that balances MIPS, watts, packet performance and cost, Freescale has created a flexible platform architecture enabling multiple products to be derived from an easily integrated IP.

The high-performance e500 core, built on Power Architecture technology, provides unprecedented levels of hardware and software debug support. The e500 core spans Freescale's processor families of ASSPs for networking, communications, automotive and consumer applications.

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PowerQUICC™ III Processor Family	MPC8541E	MPC8540	MPC8555E	MPC8560
Core	e500	e500	e500	e500
I-Cache/D-Cache (KB)	32/32	32/32	32/32	32/32
Integrated L2 Cache (KB)	256	256	256	256
Integrated Security Engine	Yes	-	Yes	-
Fast Communications Controllers	-	-	3	3
Serial Communications Controllers	-	-	3	4
Ethernet (10/100 only)	2	1	Up to 2	Up to 3
Ethernet (10/100/1000)	2	2	2	2
I²C Controller	2	1	2	2
UTOPIA Level II Ports	-	-	2	2
Multi-Channel HDLC	-	-	Up to 64 (QMC)	Up to 256
PCI Interface	2x 32-bit or 1x 64-bit	1x 32/64-bit	2x 32-bit or 1x 64-bit	1x 32/64-bit
PCI-X Interface	-	Yes	-	Yes
RapidIO® Interface	-	Yes	-	Yes

RapidIO Interconnect Technology

As a founding member of the RapidIO Trade Association, Freescale has been driving the industry's adoption of this new high-performance switch fabric control plane interconnect. RapidIO technology offers significantly greater bandwidth, scalability and reliability than other interconnects used today, yet is compatible with existing PCI and CPU architectures. It has a flexible architecture that can easily adapt to changing industry needs without affecting existing infrastructure. RapidIO technology is an open standard governed by an industry body, designed specifically for embedded, networking and communications applications.

Key Advantages

- High level of integration and performance
- Lower power consumption
- Fast time to market solution
- Enabled by RapidIO interconnect technology
- Flexible SoC platform
- Simplified board design compatibility
- Designed to integrate seamlessly with Freescale's networking, security and communications processors
- Compatible with a rich set of operating systems, compilers and development tools

Technical Specifications

- High-performance embedded e500 core available from 667 MHz to 1 GHz
  - 32-bit, dual-issue, superscalar, seven-stage pipeline
  - 2310 MIPS at 1 GHz (estimate Dhrystone 2.1)
  - 32 KB L1 data and 32 KB L1 instruction cache with line locking support
  - 256 KB on-chip L2 cache with direct mapped capability
  - Enhanced hardware and software debug support
  - Memory management unit (MMU)
  - SIMD extension with single precision floating point
- Two TSECs supporting 10/100/1000 Mbps Ethernet with two GMII/TBI/RGMII interfaces
- DDR SDRAM memory controller
  - 166 MHz, 64-bit, 2.5V I/O
  - Full ECC support
- RapidIO controller—500 MHz, 8-bit, LVDS I/O
- PCI, PCI-X controller
  - PCI 2.2 and PCI-X 1.0 compatible
  - 64- or 32-bit PCI from 16 to 66 MHz
  - 64-bit PCI-X support up to 133 MHz
  - Host and agent mode support
- Integrated 4-channel DMA controller
- Local bus with memory controller— 166 MHz, 32-bit, 3.3V I/O
- Interrupt controller
- IEEE® 1149.1 JTAG test access port
- 1.2V core power supply (1.3V for 1 GHz operation) with 3.3V and 2.5V I/O
- 783-pin FC-BGA package

Learn More: For current information about Freescale products and documentation, please visit **www.freescale.com**.

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