# MPC8555/E PowerQUICC™ III Processor

Freescale's MPC8555E PowerQUICC™ III integrated communications processor integrates a wide range of advanced Freescale technologies, modular cores and peripherals. Leveraging Freescale's system-on-chip (SoC) PowerQUICC III platform achitecture, the MPC8555E combines the powerful Book E e500 core, built on Power Architecture™ technology, and communications peripheral technology to balance processor performance with I/O system throughput. Freescale's MPC8555E device integrates two processing blocks: a high-performance e500 core that implements the enhanced Power Architecture Book E instruction-set architecture and a RISC-based Communications Processor Module (CPM) that supports a wide range of communications peripherals. This innovative architecture is designed to reduce power consumption and offer a more balanced approach to processing than traditional processor architectures. The CPM offloads low-level peripheral communications tasks, enabling the embedded e500 core to manage high-level processing tasks. The MPC8555E device's high level of integration helps simplify board design and enhances system-level bandwidth and performance. In addition to the e500 core and CPM, the MPC8555E features an integrated security engine, a double data rate SDRAM (DDR SDRAM) memory controller, dual Gigabit Ethernet controllers, a four-channel DMA controller, dual asynchronous receiver/ transmitters (DUART) and a 64-bit PCI controller that can also serve as two 32-bit PCI ports. Dual on-chip PCI support provides a cost-effective alternative to separate, discrete PCI bridges and chipsets for I/O intensive applications that require multiple PCI interfaces. In addition to these features, the MPC8555E provides a local bus controller and I²C support.

MPC8555/E Block Diagram
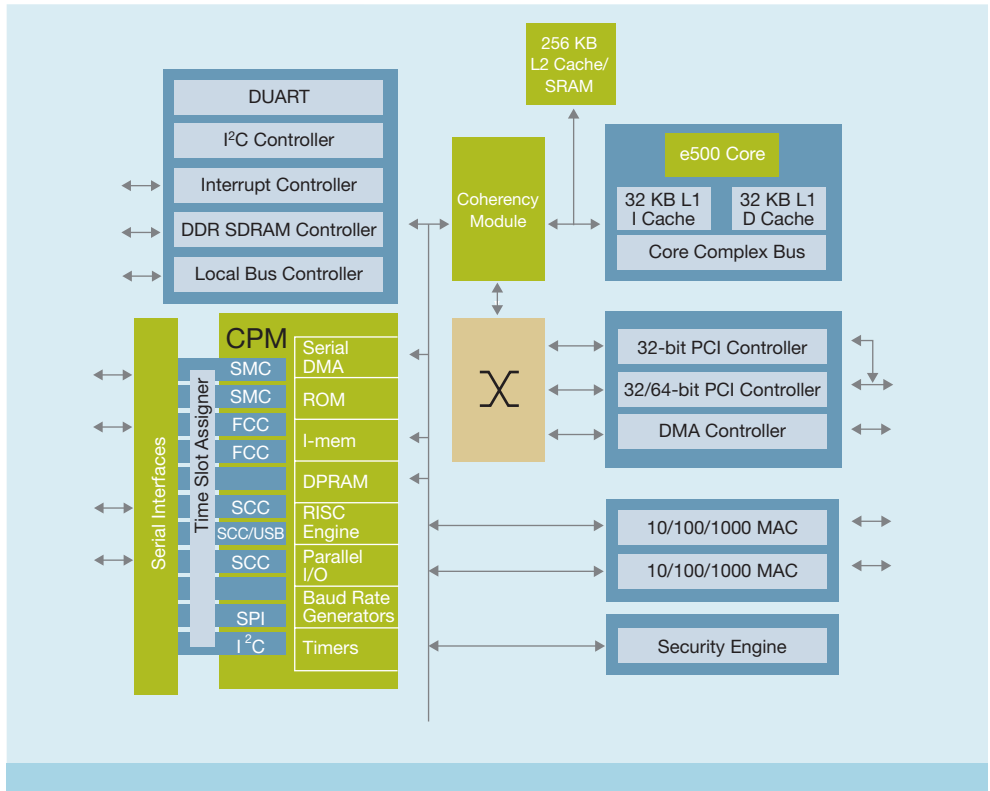
Integrated Security

The MPC8555E processor features a security engine that supports DES, 3DES, MD-5, SHA-1, AES and ARC-4 encryption algorithms, as well as offering a public key accelerator and on-chip random number generator. This embedded security core is derived from Freescale's security coprocessor product line and offers the same direct-memory access (DMA) and parallel processing capabilities, as well as the ability to perform single-pass encryption and authentication as required by widely used security protocols, such as IPsec and 802.11i. Integrated security makes the MPC8555E an optimal communications processor solution for applications that require security features in concert with high performance and low system-level cost.

Wide Range of Applications

With its high-performance core, communications processor module and integrated security engine, the MPC8555E processor offers a powerful control element for networking, communications and general-purpose embedded applications. The MPC8555E serves as an optimal host-processing solution for a multitude of compute-intensive applications, such as telecommunications, integrated access devices and metro area networks.

freescale™
semiconductor

PowerQUICC™ III Processor Family	MPC8541E	MPC8540	MPC8555E	MPC8560
Core	e500	e500	e500	e500
Available Frequencies	533 MHz–1 GHz	667 MHz–1 GHz	533 MHz–1 GHz	667 MHz–1 GHz
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	-	-	2	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	2 x 32-bit or 1 x 64-bit	1 x 32/64-bit	2 x 32-bit or 1 x 64-bit	1 x 32/64-bit
PCI-X Interface	-	Yes	-	Yes
RapidIO® Interface	-	Yes	-	Yes

Key Advantages

- High level of integration and performance
- CPM for peripheral processing tasks
- Integrated security engine
- Multiple-PCI interface support
- High-performance Book E core
- Lower power consumption
- Flexible SoC platform for fast time-to-market
- Simplified board design

Typical Applications

- Telecommunications switching equipment
- Integrated access devices
- Metro area networks
- VPN and firewall routers
- Branch office and enterprise routers

Technical Specifications

- Embedded e500 Book E core available from 533 MHz up to 1 GHz
  - 32-bit, dual-issue, superscalar, seven-stage pipeline
  - 2300 MIPS at 1 GHz (estimated 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)

- Two TSECs supporting 10/100/1000 Mbps Ethernet (IEEE® 802.3, 802.3u, 802.3x, 802.3z and 802.3 ac-compliant) with two MII/GMII/TBI/RGMII/RTBI interfaces
- 166 MHz, 64-bit, 2.5V I/O, DDR SDRAM memory controller with full ECC support
- Integrated security engine supporting DES, 3DES, MD-5, SHA-1, AES, PKEU, RNG and RC-4 encryption algorithms
- CPM to handle communications tasks
  - e500 core and CPM may run at different frequencies
  - 32-bit scalar RISC controller
  - General-purpose I/O
  - Parallel I/O registers
  - Onboard 16K of dual-port RAM
  - Two fast communications controllers (FCCs) supporting:
    - ·· Two 10/100 Base-T Ethernet MACs with MII/RMII interfaces
    - ·· Two 8-bit UTOPIA interfaces for ATM
    - ·· ATM AAL 0,1,2,5
    - ·· Multi-PHY support for 31 x 2 or 62 PHYs
    - ·· HDLC
  - Three serial communications controllers (SCCs)
  - Support for multi-channel HDLC (up to 64 channels two T1/E1)
  - Two serial management controllers (SMCs)
  - One I²C port (in addition to another I²C port in the platform)

- One serial peripheral interface (SPI)
- USB host/device interface (USB 2.0 full/low-speed compatible)
- Multiple PCI interface support
  - 64-bit PCI 2.2 bus controller (up to 66 MHz, 3.3V I/O)
  - Flexibility to configure two 32-bit PCI controllers
- 166 MHz, 32-bit, 3.3V I/O, local bus with memory controller
- Integrated four-channel DMA controller
- Dual I²C and DUART support
- 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

With more than 5,000 design wins and greater than 82 percent market share in communications processors, Freescale's PowerQUICC processors are the ideal choice for your embedded networking and communication system needs.

To learn more about Freescale's communications and networking embedded solutions, visit us on the Web: **www.freescale.com/powerquicc.**

BUILT ON Power™

freescale™
semiconductor