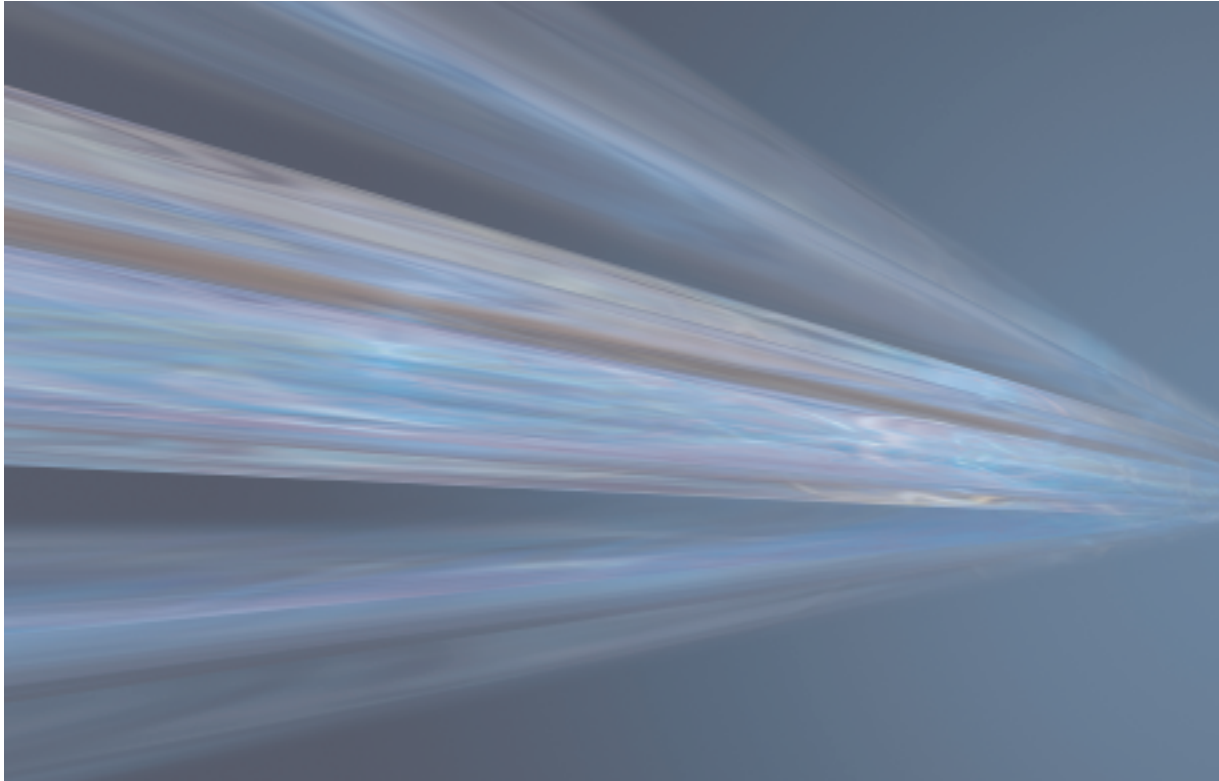# The QUICC™ Engine

Freescale's Next-Generation Communications Processor Module (CPM)

Executive Brief

Freescale Semiconductor's advanced QUICC™ Engine delivers the three Cs of convergence, compatibility and cost-effectiveness that manufacturers need to efficiently create the next generation of broadband infrastructure equipment.

The QUICC Engine is an evolutionary leap forward for the Communications Processor Module (CPM), a key component of the PowerQUICC™ architecture. The most widely used communications processors in the world, the PowerQUICC architecture containing the PowerPC® core is the technology of choice for more than 350 manufacturers of cellular basestations and controllers, digital subscriber line access multiplexers (DSLAMs), routers, switches, gateways, Passive Optical Networking (PON) solutions, voice-over-Internet Protocol (VoIP) and other equipment.

Convergence, Compatibility and Cost Effectiveness

The QUICC Engine addresses the convergence, compatibility and cost issues manufacturers face as they create products for IP convergence in broadband wired and wireless access networks.

To help manufacturers efficiently capitalize on the convergence of networks and technologies, the QUICC Engine delivers:

> Multiprotocol interworking at multi-Gbps. Interworking eliminates some protocol programming, reducing costs during migrations to IP-based networks from asynchronous transfer mode (ATM), time division multiplexing (TDM) and other protocols. The QUICC Engine is designed to enable high-bandwidth interworking without CPU intervention for high overall performance and low power consumption.

> Broadly integrated interfaces for standards such as TDM, Ethernet and the Universal Test and Operations PHY Interface for ATM (UTOPIA).

> Consistent protocol implementations for ATM adaptation layers, inverse multiplexing over ATM (IMA) and others.

Software development is a critical component in the overall design project. As an evolution of the CPM, the QUICC Engine is compatible with previous PowerQUICC generations. This helps reduce development costs and time to market, and helps protect customer investments in:
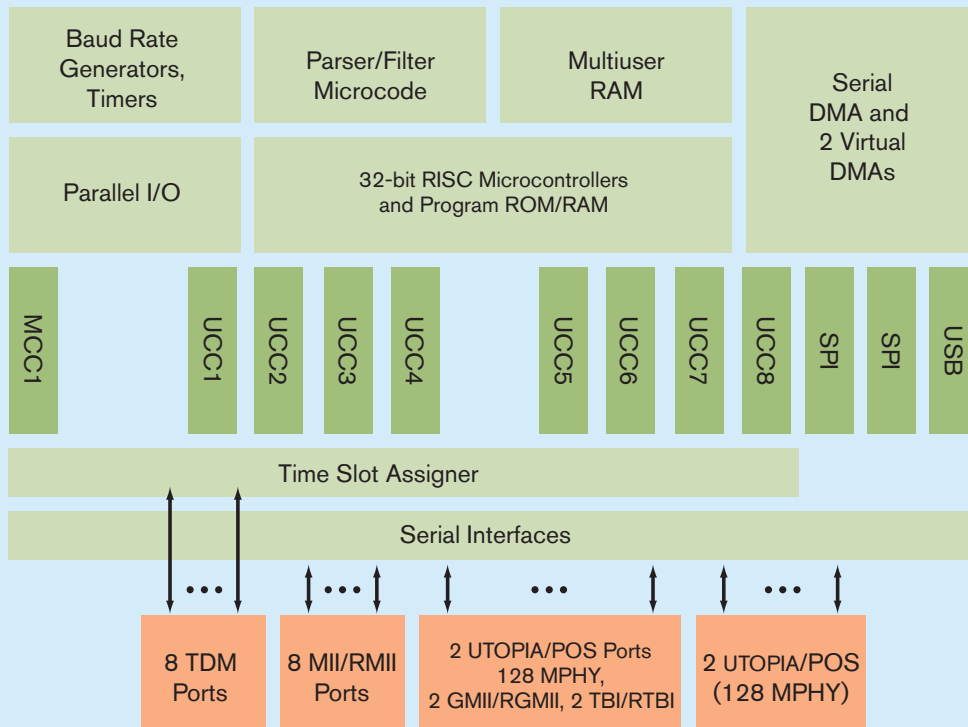
> PowerPC instruction set architecture (ISA), the most popular embedded communications processor architecture.

> CPM applications to leverage the vast installed base of PowerQUICC customer software.

> The PowerQUICC architecture's third-party development tool ecosystem, the most mature in the industry, plus ADS boards, operating systems and protocol stacks from industry leaders such as Wind River Systems, Inc., Green Hills Software, Inc., QNX Software Systems, Ltd. and many others.

> Programmer training; the QUICC Engine's programming model has the same look and feel as tools from the previous CPM.

For cost-effectiveness, Freescale's system-on-chip (SoC) integration allows the QUICC Engine to be optimized for a range of applications.

> For retail and customer premises equipment, the QUICC Engine can be configured with one RISC core to help reduce costs.

> For applications that require extremely high bandwidth, it can be configured with as many as four RISC cores.

> Unified communications controllers (UCCs) and multichannel communications controllers (MCC) can be added or subtracted depending on port-density requirements.

QUICC™ ENGINE

| Baud Rate Generators, Timers | Parser/Filter Microcode | Multiuser RAM | Serial DMA and 2 Virtual DMAs |

| Parallel I/O | 32-bit RISC Microcontrollers and Program ROM/RAM | |

MCC1 | UCC1 | UCC2 | UCC3 | UCC4 | UCC5 | UCC6 | UCC7 | UCC8 | SPI | SPI | USB

Time Slot Assigner

Serial Interfaces

| 8 TDM Ports | 8 MII/RMII Ports | 2 UTOPIA/POS Ports 128 MPHY, 2 GMII/RGMII, 2 TBI/RTBI | 2 UTOPIA/POS (128 MPHY) |

Application Examples

In VoIP applications, the QUICC Engine is ideal for gateways between traditional TDM networks and IP systems based on QUICC Engine technology enabling from 672 to more than 2,000 voice channels.

Typical PowerQUICC II™ Pro applications include:

> Remote access servers

> Small/medium enterprise routers

> Small office/home office (SOHO) routers

> LAN to WAN bridge routers

> Cellular infrastructure

> Media gateways

> Telecom switch controller DSLAMs

Learn More: For more information about the QUICC Engine and products that incorporate it or other Freescale communications processor products, please visit **www.freescale.com/QUICCEngine**.

> Synchronous Optical Network (SONET) transmission controllers

> Industrial controllers

> PON optical line termination

> Cable head ends

PowerQUICC II Pro with the QUICC Engine adds:

> IP-DSLAM line cards and uplink cards

> VoIP gateways

> 3G basestations

> Integrated voice routers for IP private automated branch exchange

> PON optical network units

> WiMAX IEEE® 802.16 wireless basestations and super access points

DSLAMs and ATM-to-Ethernet conversion equipment—along with similar PON equipment—can be created with industry-leading price/performance and port density. Using the QUICC Engine's MCC, UTOPIA MPHY capability, DSLAMs can handle as many as 128 PHYs per UTOPIA, supporting the 124 PHY standard interface connection. Support for ATM-to-Ethernet interworking and IP aggregation makes the QUICC Engine ideal for PON optical network termination systems.

The transition from 2G and 2.5G to all-packet 3G wireless infrastructure requires interworking and switching with legacy TDM and ATM basestations. By supporting up to 256 channels, offering an IP legacy link and maintaining software compatibility with legacy systems, the QUICC Engine can help significantly reduce equipment costs in this transition.

Launched by Motorola

freescale™
semiconductor