Expanding the QorIQ P5 Family: P5040 & P5021

QorIQ Processing Platforms

T5xxx *(Future)* NEW -- P5021, P5040 P5010, P5020	**High performance control plane processing** • Up to 2.5 GHz • Large L2 caches	**Service Provider Routers** **Fabric Controller** **Storage Networks**
T4240, T4160 *T4xxx, T3xxx* *(Future)* P4080, P4040, P3041	**Mixed control and data plane processing** • Up to 1.8 GHz • Highly-parallelized workloads • 48 Gbps IP forwarding • High amount of off-load	**Metro Carrier Edge Router** **Aerospace & Defense** **Datacenter/ Network Services**
T1xxx, T2xxx *(Future)* P101x(8), P102x(5), P2x(4)	**Optimal performance to power ratio** • Up to 1.6 GHz • Less than 10W • Broadest portfolio of power-efficient SoCs	**Integrated Services Router** **Network Attached Storage** **Media Gateway**

Expanding the Industry's Leading Networking Portfolio

QorIQ
AMP Series
T4240/T4160 (28nm)

QorIQ
P Series
23+ products (45nm)

PowerQUICC
70+ products
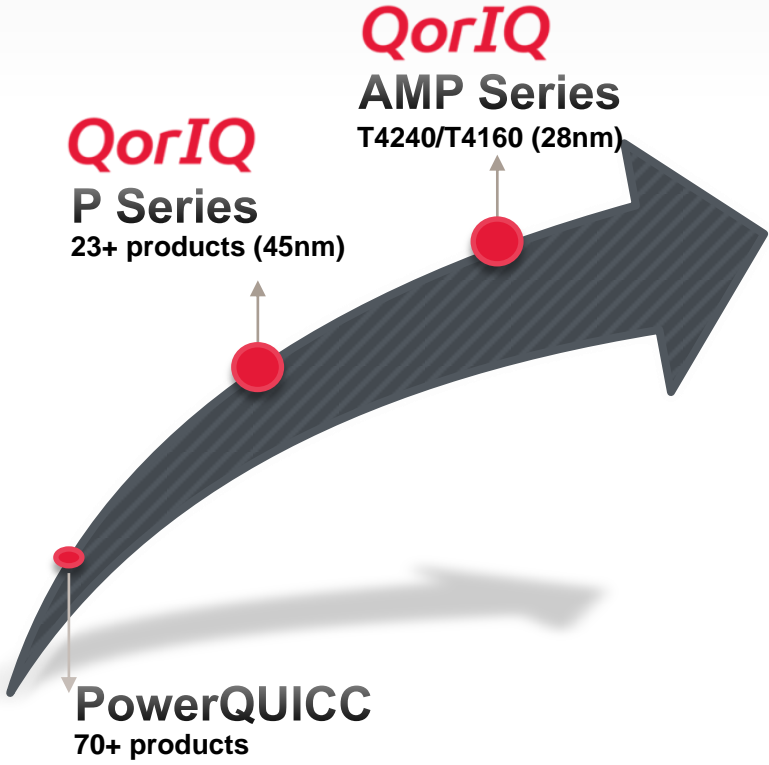
The tremendous growth of wired and wireless data has increased demand for both control plane and mixed control/data plane processing.

The T4 family within the QorIQ Advanced Multiprocessing (AMP) Series supports the highly parallelized workload requirements of mixed control & data plane applications with multithreaded, multicore processors.

The P5 family addresses the needs of **compute intensive control plane applications** with devices that integrate the **highest performance single-threaded cores** in the QorIQ portfolio.

- Broad portfolio with on-time, on-specification release track record
- Software and tools ecosystem catering for Tier1 and broad market customers
- Common software tool sets including CodeWarrior Development Suite and VortiQa
- Open, rich third-party ecosystem for operating system, tools and application software

BUILT ON

Power

3

Expanding the QorIQ P5 Family

- **Announcing two new QorIQ P5 family devices with top-tier single-threaded performance for power-conscious control plane applications: QorIQ P5040 and P5021**

  - A scalable processor family with single-, dual- and quad-core options

  - Balanced architecture features up to 4 high-performance 64-bit e5500 Power Architecture® cores and low latency memory hierarchy for compute-intensive applications with tight thermal constraints

    - Support for core frequencies up to 2.4 GHz

    - Typical power consumption less than 22 Watts

    - 3-4x the performance of previous generation control plane processors

  - Intelligent integration of cores, accelerators and advanced I/O to achieve optimum system performance while reducing system development and thermal management costs
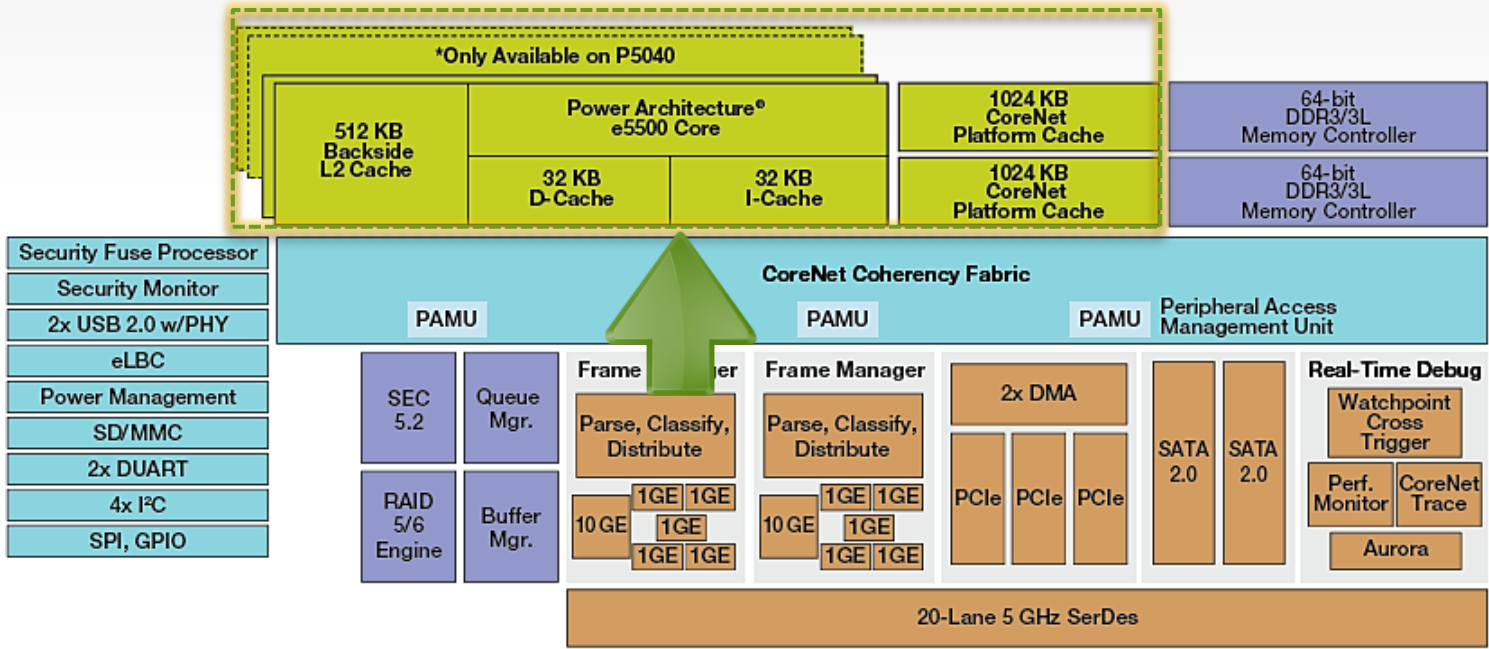
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QorIQ P5040/5021 Block Diagram

Core Complex (CPU, L2 and Frontside CoreNet Platform Cache)
Basic Peripherals and Interconnect
Accelerators and Memory Control
Networking Elements

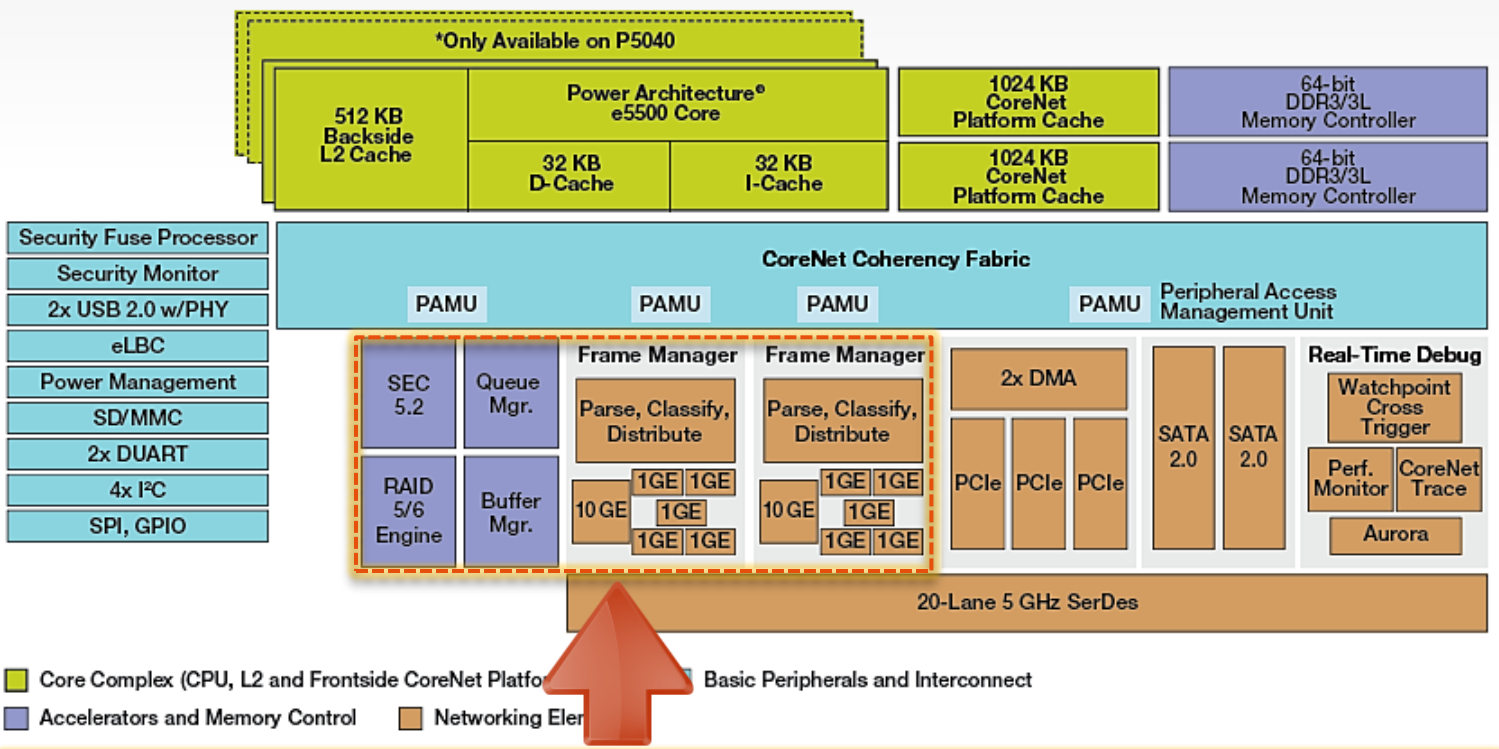## High Performance Core/Caches

Power Architecture e5500 core	Up to 2.4GHz Up to 64-bit addressable memory space
512KB/core L2 **2MB CPC (L3)**	Tightly coupled cache hierarchy for low latency

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QorIQ P5040/5021Block Diagram

Hardware Accelerators	
FMAN **Frame Manager**	24 Gbps aggregate Parse, Classify, Distribute
BMAN **Buffer Manager**	64 buffer pools
QMAN **Queue Manager**	Up to 2^{24} queues
SEC **Security**	IPSec, SSL | Public Key 25K/s 1024b RSA
RAID5/6	RAID5/RAID6 parity generation

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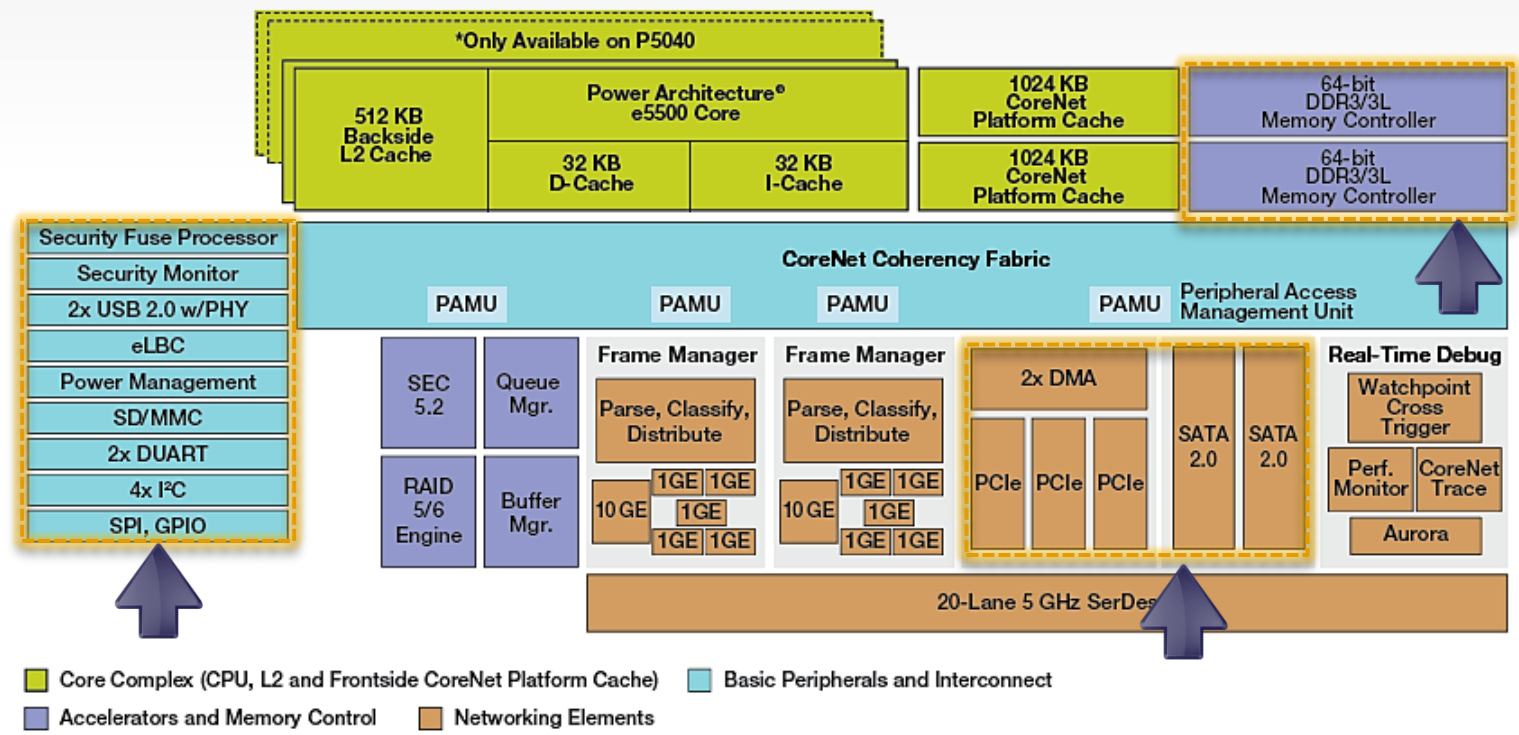
High Performance I/O –	
Dual DDR3/3L	64-bit, 1600MT/s
Dual 10GbE	24Gbps Classify, Parse, Distribute
10x 1GbE	
PCIe Gen2.0	3x PCIe controllers (5Gbps)
USB	Dual with integrated PHY
IFC	Legacy ASIC connectivity & modern flash controller
Serial Peripherals	SATA, USB, UART, SPI, etc

7

P5040 Target Markets, Key Features

Enterprise / Service Provider Equipment

Fabric Controller

Storage Networks

Aerospace & Defense

The P5040 and P5021 embedded processors were architected to provide maximum benefit for the target markets

Balanced Architecture

– High-performance cores – power efficiency

– Up to 64-bit addressable memory space

– Up to 2.4GHz with < 35W TDP

CoreNet On-chip Fabric

– Designed to "feed" the cores

– Eliminates bus contention

– Optimizes efficiency of each core

High Speed Interconnect

– PCIe, SGMII, XAUI, SATA, Aurora

Tightly Coupled Cache Hierarchy

– Optimum memory architecture

– Cores are closer to the data to reduce latency

Application-Specific Accelerators

– Provides optimum performance/power

– Security, Packet-processing offload, RAID5/6

P5 Customer Platforms – Speed Time to Market

General Purpose Dev Systems

P5040 QDS
- Full features development
- Evaluation
- Development

General Purpose Development System

P5040 RDB
- Low cost 1U development platform
- Evaluation
- Development

Enterprise and Datacenter Appliance

System Solutions Dev Systems

P5040 ATCA
- Wired & wireless service provider applications
- Evaluation
- Development
- Production

Industrial

P5040 PCIe
- Host data path
- Evaluation
- Development
- Production

Datacenter

June 2012   *Late Summer 2012*   *Partner announcements coming soon*

Comprehensive Solutions, Rich Ecosystem

Tools and Operating Systems	Virtualization	Application Software	Systems Integration & Services	Development Systems
CodeWarrior	KVM	freescale VortiQa	RadiSys	
criticalblue — Accelerating Embedded Software	lxc Linux Containers	Elliptic — Embedded Security you can Trust	MERCURY COMPUTER SYSTEMS	
ENEA	freescale ™	6WIND / Bitdefender	ADVANTECH	
Green Hills SOFTWARE, INC.	Green Hills SOFTWARE, INC.	Broadweb — empower your network security	Portwell	
mentor embedded	ENEA	MERCURY COMPUTER SYSTEMS	Lanner	
WIND RIVER	WIND RIVER	One Convergence / mocana	EMERSON Network Power / FLEXTRONICS	
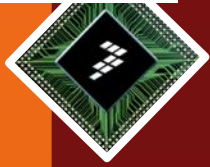
Summary
QorIQ P5040/5021

Top-tier single threaded performance for power-conscious control plane applications

Scalable Processor Family – Building on the single and dual-core processors in the QorIQ P5 family, the P5040 delivers a pin compatible quad-core option for control plane applications

Balanced Architecture – With 4 high-performance cores and low latency memory hierarchy, the P5040's architecture provides an ideal solution for compute-intensive applications with tight thermal constraints

Intelligent Integration – of cores, accelerators and advanced I/O for optimal system performance with reduced development and thermal management costs

Availability – Devices and a full-featured development system with Freescale Linux® SDK will be offered in June 2012. Software and tools support from Enea, Green Hills Software, Mentor Graphics and QNX in 2H '12.

www.freescale.com/QorIQ