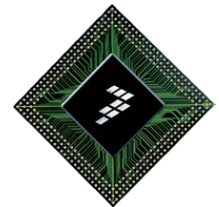June 2011

Power Architecture® 32- and 64-bit Processors. PowerQUICC and QorIQ Processors Overview and Roadmap
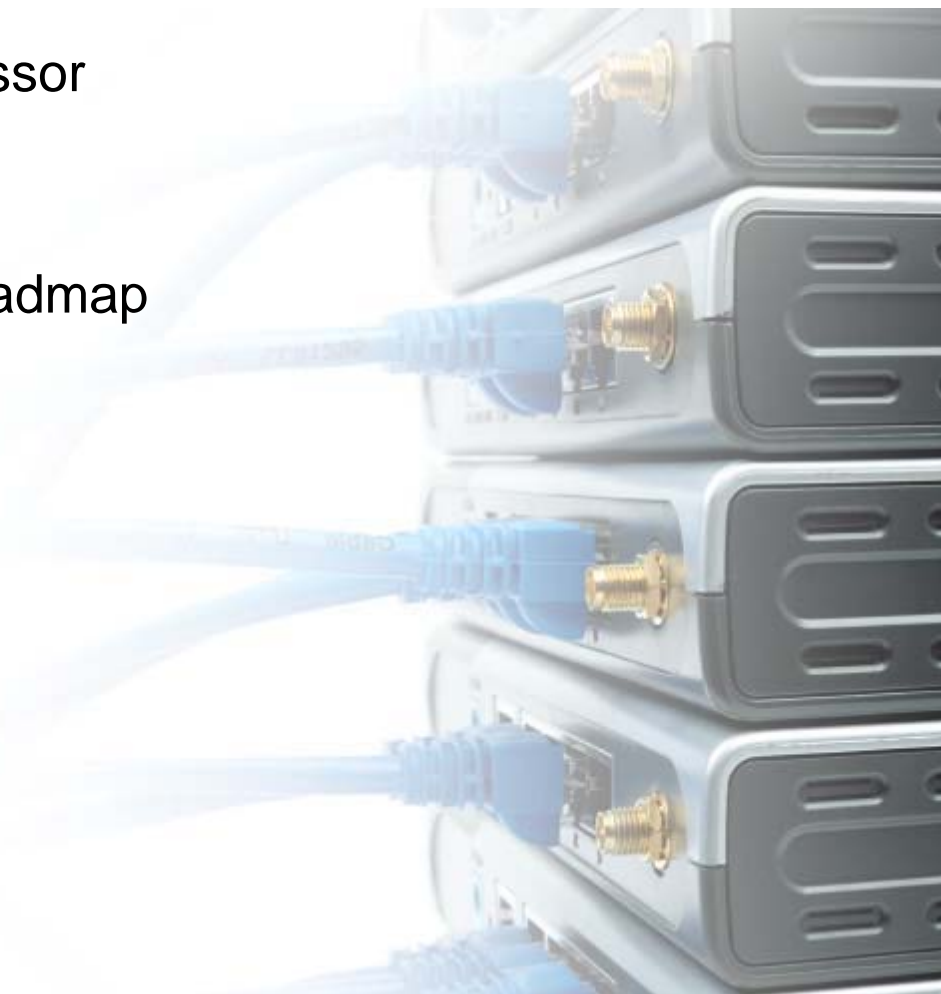
Piotr Weglicki

EMEA Networking Marketing Manager

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► Market Trends and Impact on Processor Architectures

► Power Architecture® Technology Roadmap

► MuQorIQ System Solutions

► Enablement

► Q&A

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Smart, Efficient Networking Backbone for Trusted Connections

Internet and Cloud Based Services

Smart Networks
Wireless & Wired
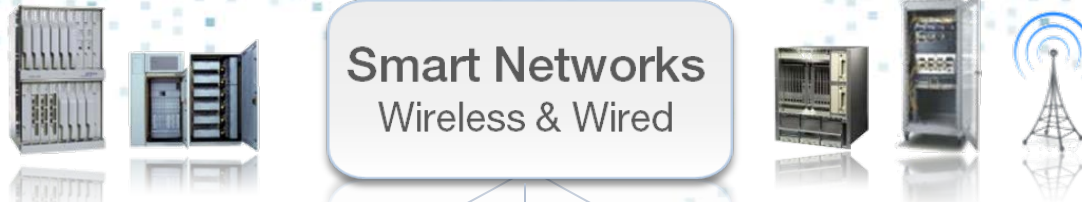
Smart Connected Devices

Consumer/Residential

Tablets	Mobile Devices
eReaders	Smartphone
Smartbooks	Residential Gateway
	Smart Meter

Industrial/Mil/Aero/Auto

Factory HMI	Telematics
Medical Devices	Auto Infotainment
Smart Energy Grid	Machine to Machine

Enterprise & SMB

Energy Gateways	Touchscreen Printers
Human Collaboration	Mobile Computing
Video/IP Phones	Desktop Computing
Wireless Access Pomit	

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Multicore Solutions in the Heart of Our Connected World

Growth Relative to 2008=1

Legend:
- Normalized IP Traffic
- Normalized Subscribers
- Normalized Capex
- Normalized SAM
- Moore's Law

The Gap

"The Gap"
Exponentially increasing performance demands cannot be met by Moore's Law *alone*.

Y-axis: 0.0, 0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0

X-axis: 2008, 2009, 2010, 2011, 2012, 2013
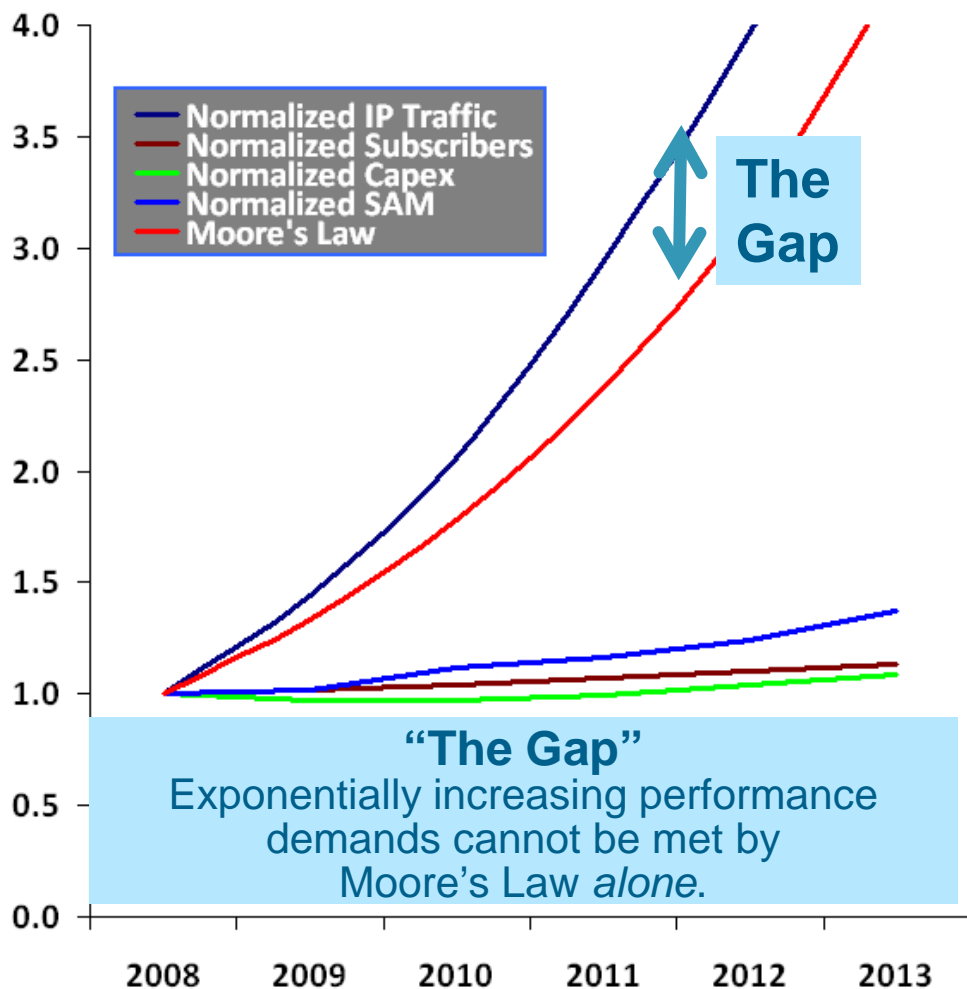
▶ **Stagnating CapEx drives increased CapEx efficiency**

▶ **Ability to deliver 'more services' at lower CapEx…**

▶ **Service density and data deluge of network traffic drives significant opportunities in *Multicore SoC***

▶ **Freescale closes "The Gap" with a "balanced, application-driven architecture":**
- *Smart* multicore devices
- Targeted application acceleration
- Hardware assisted virtualization
- Aggressive process technology
- Extensive ecosystem and VortiQa multicore optimized software

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Application-Driven, Balanced Multicore Architecture

"Intelligence is the ability to avoid doing work, yet getting the work done."
- Linus Torvalds

Purpose of Balanced Architecture is to make the cores/multicore SoC more productive. Simultaneously, enabling a lower power & lower complexity software with very high networking performance
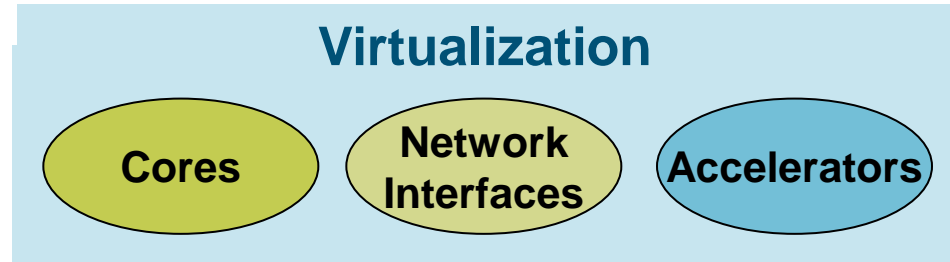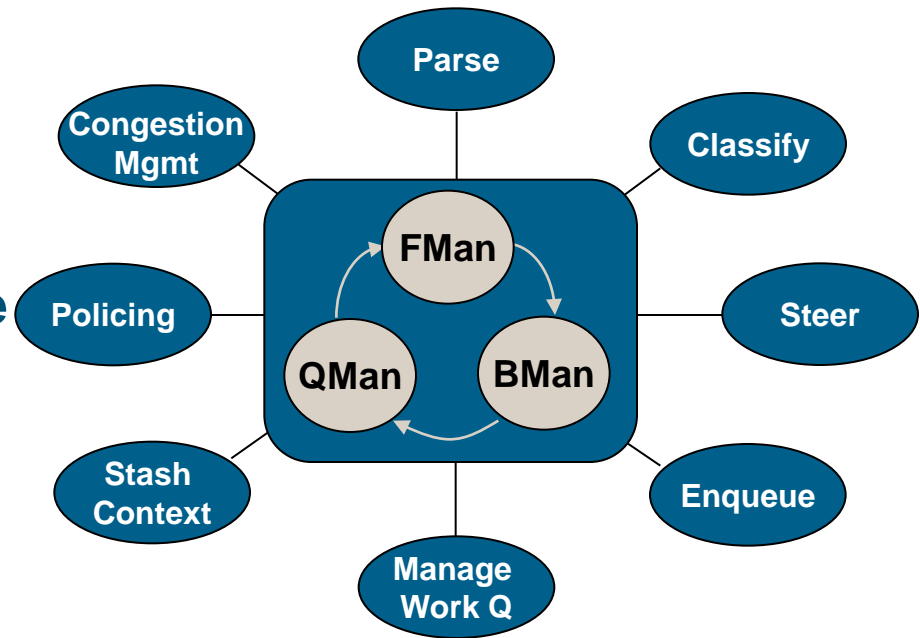
Increasing the number of cores does not guarantee improved performance

► **Distributing packets to different cores**
► **Parse and classify, load-steering, network accelerators (Crypto, DPI, etc.) and multi-level prioritized queuing**
► **Maintaining flow order**
► **Shared data structures**

Handles over-the-top traffic & services

► **Bandwidth-intensive multimedia and mobile traffic affected by social patterns or new service creation (Facebook, Telepresence, Skype)**

Virtualization

Cores Network Interfaces Accelerators

QorIQ P4 Platform DPAA

Parse
Congestion Mgmt
Classify
FMan
Policing
Steer
QMan BMan
Stash Context
Enqueue
Manage Work Q

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QorIQ P4 Series P4080/40 Block Diagram

128 KB Backside L2 Cache

Power Architecture™ e500-mc Core

32 KB D-Cache

32 KB I-Cache

1024 KB Frontside L3 Cache

1024 KB Frontside L3 Cache

64-bit DDR-2 / 3 Memory Controller

64-bit DDR-2 / 3 Memory Controller

CoreNet™ Coherency Fabric

PAMU

PAMU

PAMU

PAMU

PAMU — Peripheral Access Mgmt Unit

eOpenPIC

PreBoot Loader

Security Monitor

Internal BootROM

Power Mgmt

SD/MMC

SPI

2x DUART

4x I^{2}C

2x USB 2.0/ULPI

Clocks/Reset

GPIO

CCSR

eLBC

Security 4.0

Queue Mgr.

Test Port/ SAP

Pattern Match Engine 2.0

Buffer Mgr.

Frame Manager

Parse, Classify, Distribute

Buffer

10GE

1GE 1GE

1GE 1GE

Frame Manager

Parse, Classify, Distribute

Buffer

10GE

1GE 1GE

1GE 1GE

RapidIO Message Unit (RMU)

2x DMA

PCIe

PCIe

SRIO

PCIe

sRIO

X

Real Time Debug

Watchpoint Cross Trigger

Perf Monitor

CoreNet Trace

Aurora

18-Lane   5 GHz SerDes

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QorIQ Platform Levels

PLATFORMS / PRODUCTS	DESCRIPTION	APPLICATION EXAMPLES
QorIQ P5 PRODUCTS: P5010 P5020	**Highest-performing embedded processors**	**Service Provider Routers** **Network Admission Control** **Storage Networks**
QorIQ P4 PRODUCTS: P4080 P4040	**Tap the full potential of multicore with this "many-core" platform**	**Metro Carrier Edge Router** **IMS Controller** **Radio Network Control** **Serving Node Router (GSN)**
QorIQ P3 PRODUCTS: P3041	**Your first step into true multicore performance**	**Converged Media Gateway** **SSL, IPSec, Firewall** **Access Gateway**
QorIQ P2 PRODUCTS: P2040, P2041 P2020 P2010	**Unprecedented performance per watt in this highly integrated platform**	**Unified Threat Management** **VoIP Carrier-Class Media Gateway** **Wireless Media Gateway** **Base Station**
QorIQ P1 PRODUCTS: P1010, 1011, 1012, 1013 P1014, 1015, 1016, 1017 P1020, 1021, 1022, 1024, 1025	**A highly integrated, cost-effective, low-power platform**	**Integrated Services Router** **Network Attached Storage** **Home Media Hub**

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QorIQ P1/P2 Target Applications

- **Networking (switches and routers)**
  - Line card controller
  - Mid-range line card control plane
  - Low-end line card combined control and data plane
  - Shelf controller
  - Business gateway
  - Multiservice router
  - Wireless access points
- **Telecom**
  - AMC card
  - Controller on ATCA Carrier Card
  - Channel and control card for NodeB, BTS, WCDMA, 4G LTE, WiMax
  - General-purpose compute blade
- **Industrial**
  - Robotics
  - Test/measurement Networking/telecom
  - Multifunction printer
  - Single board computers
  - Industrial applications
- **Key Advantages**
  - High single-threaded performance
    - Efficient core: 2-instruction, 2.4 DMIPs/MHz
    - High frequency: up to 1.2GHz
  - Enables performance without complexity of partitioning across multiple cores or threads
  - Highly suitable for control plane applications whose sequential nature means efficiency is lost with scaling to many cores
  - Pin compatibility over 4.5x frequency range enables BOM-based product differentiation
  - Low power

QorIQ P1010 Block Diagram
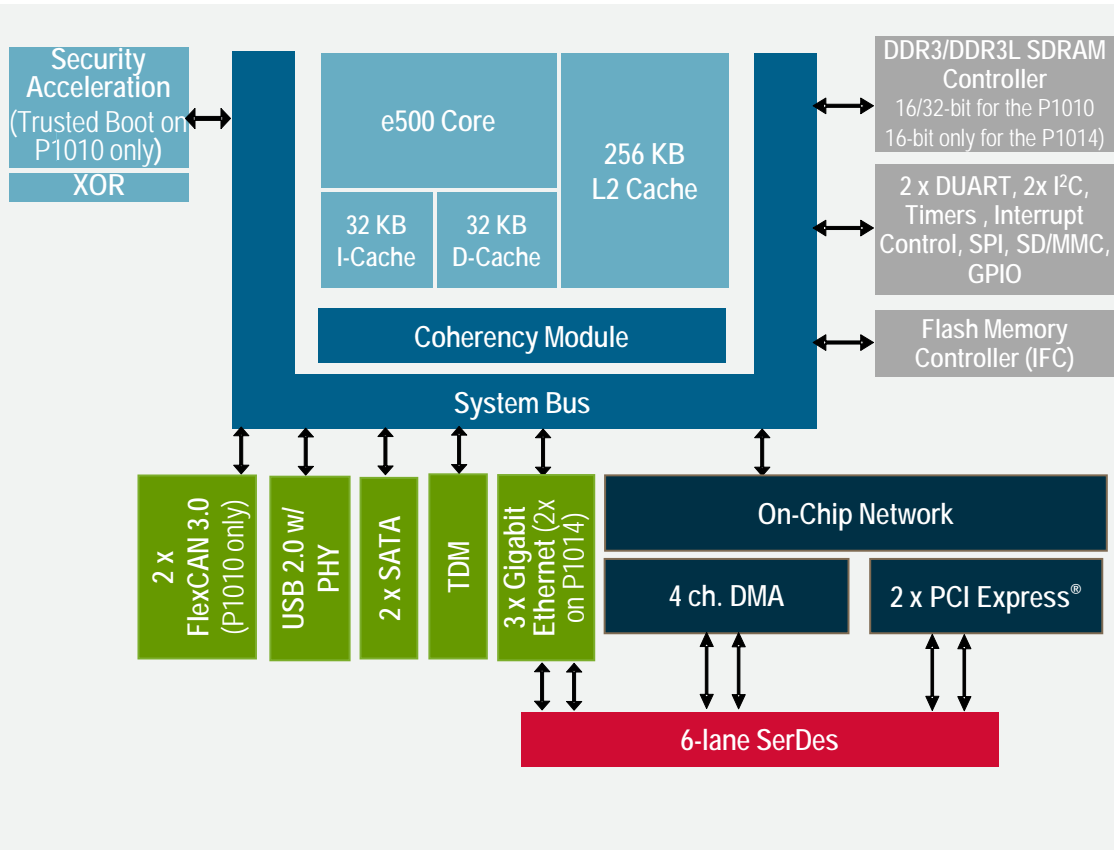
e500 v2, 533 - 800 MHz

- 256 KB Frontside L2 cache w/ECC, HW cache coherent
- 36-44 bit physical addressing

System Unit

- 16/32-bit DDR3, 800 MHz data rate w/ECC
- Integrated SEC 4.x Lite Security Engine with Secure Boot
- Flash memory controller supporting NOR, SLC and MLC based NAND devices
- 1 x USB 2.0 controllers Host/Device support with Integrated PHY
- SD/MMC card controller supporting booting from Flash memory cards
- VortiQa based data path acceleration with 3 x 10/100/1000 Ethernet controllers w/ Jumbo Frame support, SGMII interface, IEEE® 1588v2 support
- 2 x PCI Express® 1.0a controllers operating up to 2.5 Gbps
- 2 x SATA controllers, 3.0 Gb/S
- 2 x FlexCAN 3.0 controllers
- 4 x UARTs, 2 x I²Cs

Process & Package

- 45nm SOI
- 425-pin TEPBGA I (19 mm x 19 mm, 0.8 mm pitch)
- <1.1W power consumption

QorIQ P1010 and P1014 Target Applications

Network attached storage / digital video surveillance
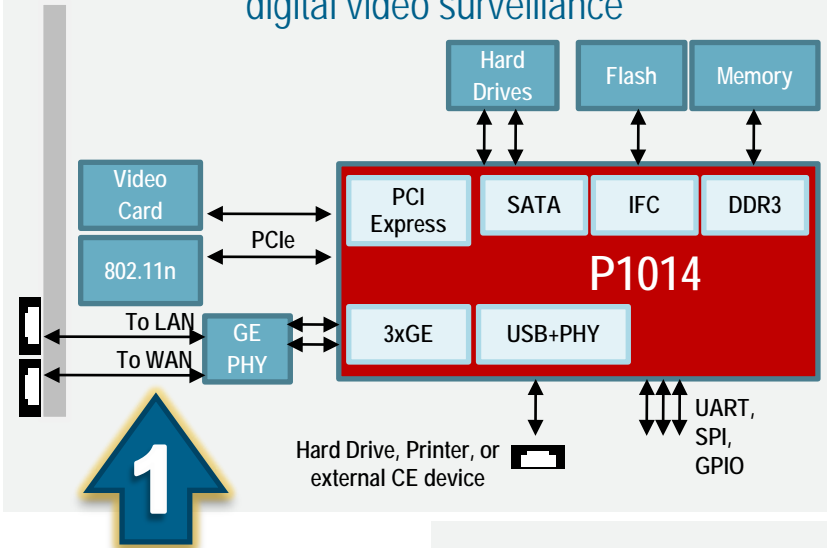
(NAS/DVR) systems benefit from leading performance and integration (PCI Express® and SATA interconnects) enabling higher storage throughput in low BOM systems.

Industrial networking applications enjoy the unique product differentiation of a trusted architecture that enables complete code signing and secure boot. Coupled with the integration of industrial interfaces (CAN) and outstanding performance in a power envelope of less than 1.1W to provide the ingredients for the most innovative designs in the segment.

Cost efficient routing applications
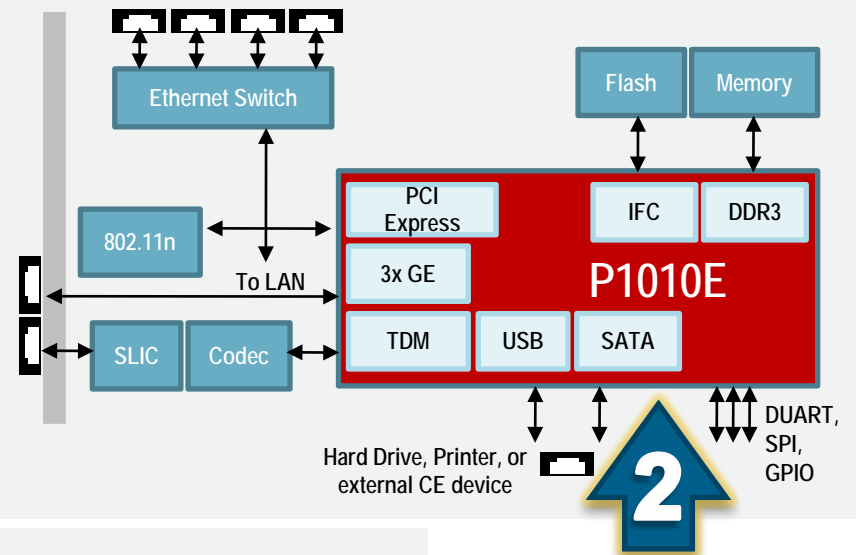
Cost sensitive routing applications enjoy the benefits of software data path acceleration to increase networking performance. A small package (19x19mm) and low power will enable low bill of materials – fan-less designs

Industrial Networking
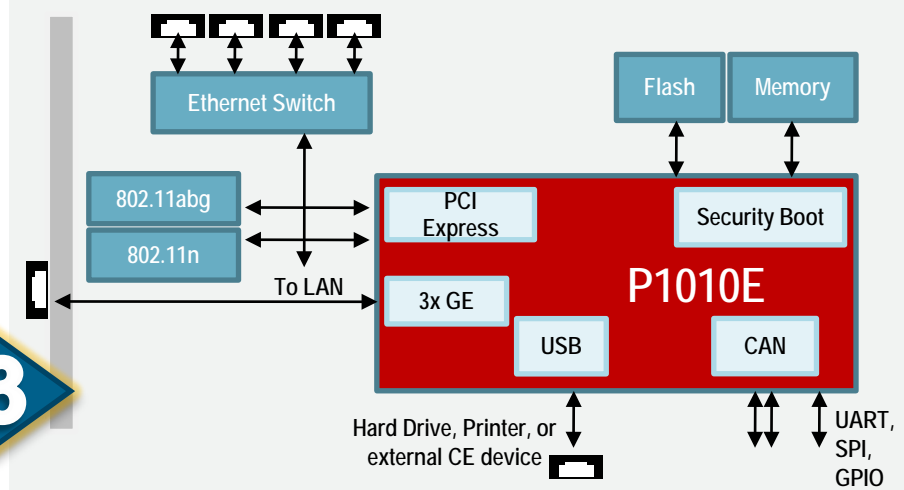
Dual-Core P1020 Block Diagram
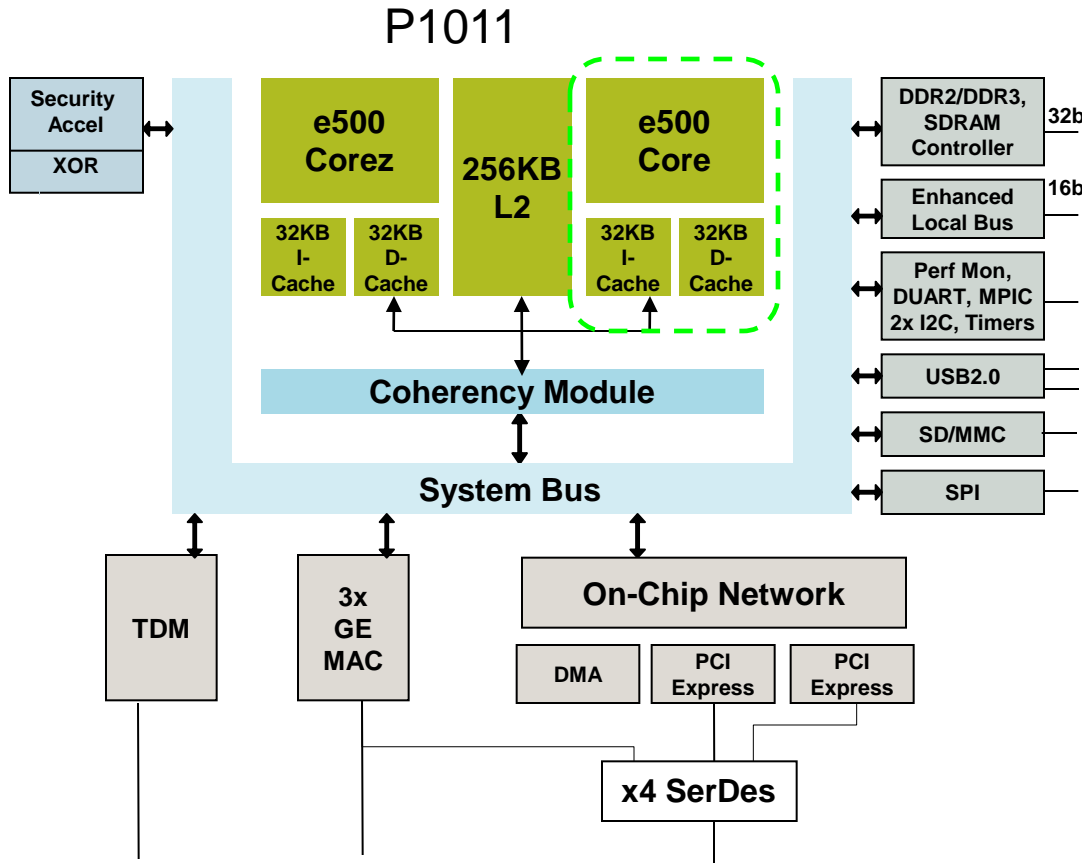
- **Dual e500 Power Architecture™ core**
  - 533 – 800 MHz
  - 256KB Frontside L2 cache w/ECC, HW cache coherent
  - 36 bit physical addressing, DP-FPU
- **System Unit**
  - 32-bit DDR2/DDR3 with ECC to 800MHz datarate
  - Integrated SEC 3.3 Security Engine
  - Open-PIC Interrupt Controller, Perf Mon, 2x I2C, Timers, 16 GPIO's, DUART
  - 16-bit Enhanced Local Bus supports booting from NAND Flash
  - Two USB 2.0Controllers Host/Device support
  - SPI controller supporting booting from SPI serial Flash
  - SD/MMC card controller supporting booting from Flash cards
  - TDM interface
  - Three 10/100/1000 Ethernet Controllers (eTSEC) w/ Jumbo Frame support, SGMII interface
    - Enhanced features: Parser/Filer, QOS, IP-Checksum Offload, Lossless Flow Control
    - IEEE1588v2 Support
  - Two PCI Express 1.0a Controllers operating at 2.5GHz
  - Power Management
- **Process & Package**
  - 45nm SOI, XX +/- XX, 0C to 125C Tj
    - with -40C to 125C Tj option
  - 689-pin TePBGAII, 31x31mm

Multi Service Business Gateway Platform Architecture

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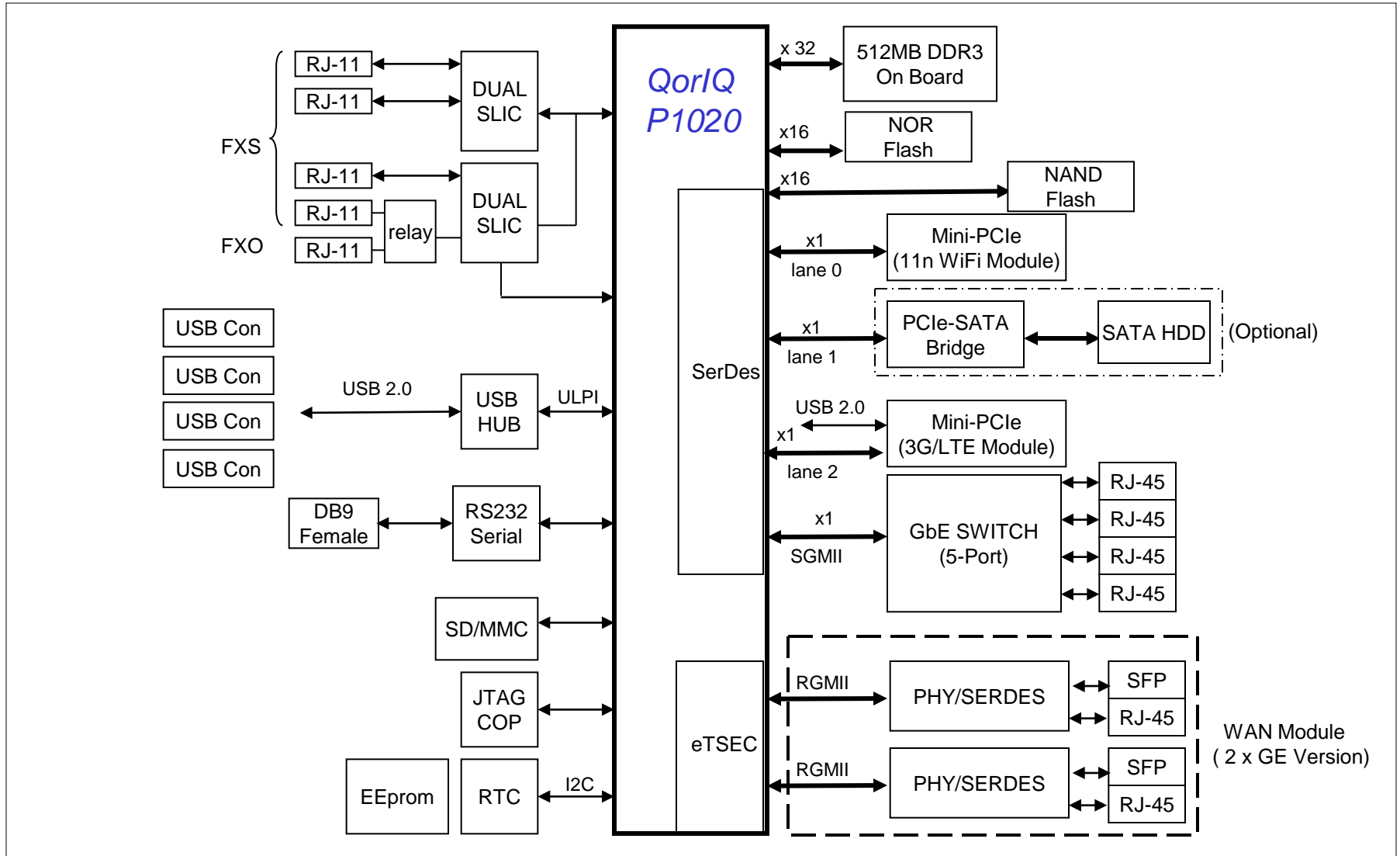
P1020MSBG
Multiservice Gateway

P1020

- Security Accel
- XOR
- e500 Corez
  - 32KB I-Cache
  - 32KB D-Cache
- 256KB L2
- e500 Core
  - 32KB I-Cache
  - 32KB D-Cache
- Coherency Module
- System Bus
- DDR2/DDR3, SDRAM Controller — 32b
- Enhanced Local Bus — 16b
- Perf Mon, DUART, MPIC, 2x I2C, Timers
- USB2.0
- SD/MMC
- SPI
- TDM
- 3x GE MAC
- On-Chip Network
  - DMA
  - PCI Express
  - PCI Express
- x4 SerDes

P1020EWLAN Enterprise and SMB WiFi AP

2 x USB 2.0   2 x GE

P1020WLAN(Enterprise Access Point)

► **General Features:**
- P1020 (800MHz Core, 667/800DDR3)
- Memory subsystem:
  - 256MB to 512MB DDR3 SDRAM
  - Up to 64MB NOR FLASH
  - Up to 256MB of NAND Flash
- Support Atheros AR93xx series and Ralink miniPCIe card;
- Support 802.11a/b/g/n dual band dual cards
- 3 x 3 MIMO solution
- Proven Opensource OpenWRT application program
- Arada Advance Wireless Enterprise AP Software (evaluation copy)
- Support system configuration & management using GUI;
- Reset & Factory default
- 2x MiniPCI-e, 2x10/100/1000 Base-T, USB Type A connector
- Power over Ethernet support
- FCC/CE Class A certified
- Mini-ITX form factor PCB

► **Ordering Information:**
- P1020WLAN - Support Atheros XB114 MiniPCIe card

► **Available now**

QorIQ P1021 Block Diagram

P1012

Security Accel		
XOR		

e500 Corez

256KB L2

e500 Core

32KB I-Cache / 32KB D-Cache

32KB I-Cache / 32KB D-Cache

DDR2/DDR3, SDRAM Controller — 32b

Enhanced Local Bus — 16b

Perf Mon, DUART, MPIC 2x I2C, Timers

USB2.0

SD/MMC

SPI

Coherency Module

System Bus

QUICC Engine — UTOPIA, TDM, MII

3x GE MAC

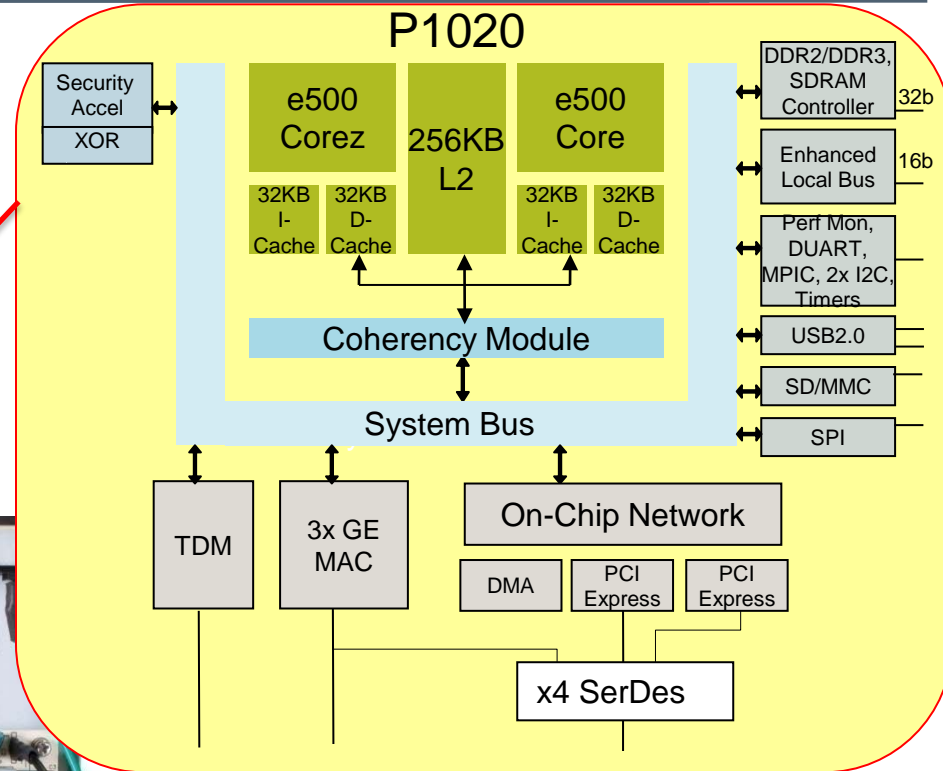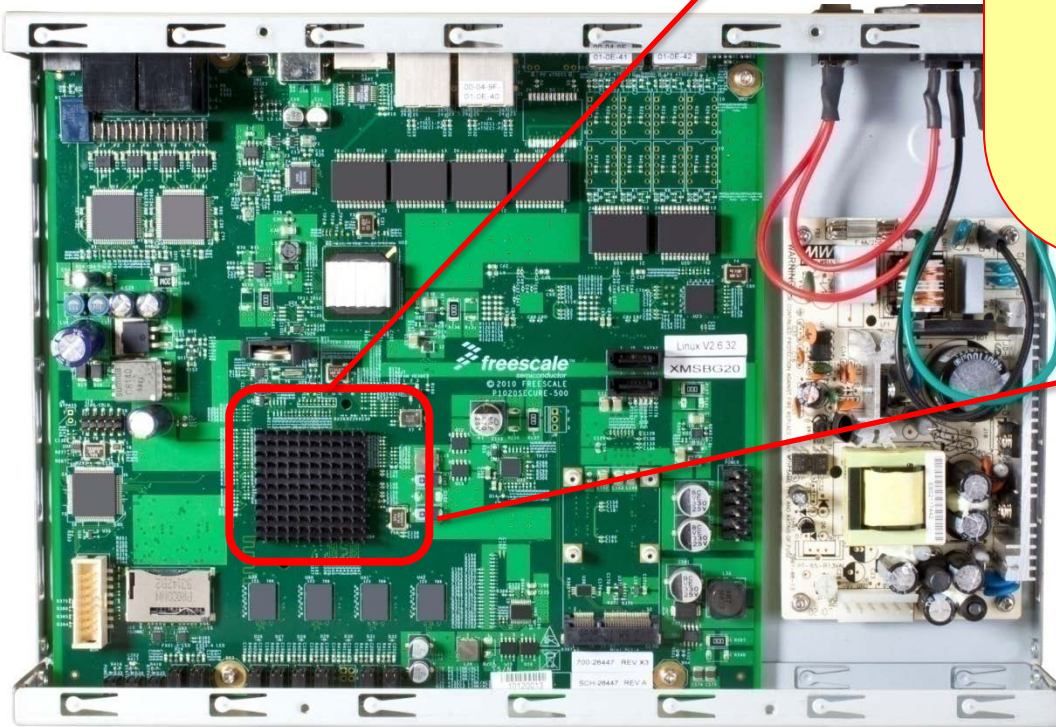**On-Chip Network**

DMA

PCI Express

PCI Express

x4 SerDes
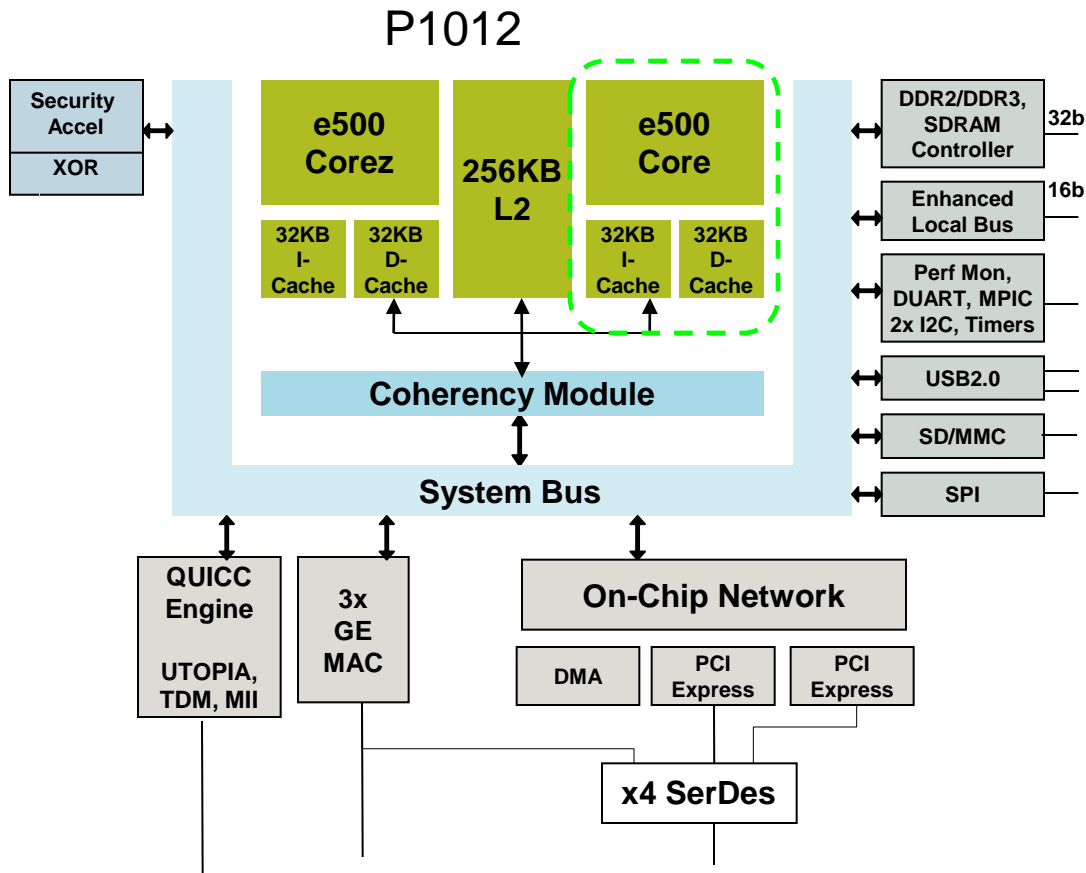
- **Dual e500 core; 533 - 800 MHz**
  - 256KB Frontside L2 cache w/ECC, HW cache coherent
  - 36 bit physical addressing, DP-FPU
- **System Unit**
  - 32-bit DDR2/DDR3, 800 MHz data rate w/ECC
  - Integrated SEC 3.3 Security Engine
  - Open-PIC Interrupt Controller, Perf Mon, 2x I2C, Timers, 16 GPIO's, DUART
  - 16-bit Enhanced Local Bus supports booting from NAND Flash
  - USB 2.0Controllers Host/Device support
  - SPI controller supporting booting from SPI serial Flash
  - SD/MMC card controller supporting booting from Flash cards
  - Three 10/100/1000 Ethernet Controllers (eTSEC) w/ Jumbo Frame support, SGMII interface
    - IEEE1588v2 Support
  - QUICC Engine for protocol off load and legacy interfaces
    - TDM interfaces with HDLC support
    - UTOPIA-L2 interface for ATM support
  - Two PCI Express 1.0a Controllers operating up to 2.5Gbps
  - Power Management
- **Process & Package**
  - 45nm SOI, 0.95V+/-50mV, -40C to 125C Tj
  - 689-pin TePBGAII

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► Hardware

- Small form factor P1022 reference system

- Single / Dual Core P10X0 MSBG

- P101X Development System

MSBG
P10X0
Development
System

► Software

- NAS Optimized P10XX BSP

- Openfiler on Power Architecture

- Live555 streaming media server

- Allegro DLNA

- Tuxera optimized NTFS

- Vortiqa™ software application packages a

P1022/13 Development System
& Daughter Module

QorIQ P1023/P1017 Block Diagram

Not available On P1017

| Power Manage-ment |
| e500 Core |
| 256KB L2 |
| e500 Core |

32 KB I-Cache | 32 KB D-Cache | 32 KB I-Cache | 32 KB D-Cache

DDR3/3L, SDRAM Controller — 32b

Enhanced Local Bus — 16b

Perf Mon, DUART, MPIC 2x I²C, Timers

USB2.0

SPI

Coherency Module

System Bus

Security 4.2

On-Chip Network

PCI Express® | PCI Express | PCI Express | DMA(2x4)

Buffer Mgr.

Queue Manager

x4 SerDes

Frame Manager

Buffer

1GE | 1GE

- Dual/Single e500 Power Architecture® cores
  - 800 MHz
  - 256KB Frontside L2 cache w/ECC, HW cache coherent
  - 36-bit physical addressing, DP-FPU
- System Unit
  - 32-bit DDR3/3L up to 667 MHz data-rate (Async to core and platform freq)
  - Open-PIC Interrupt Controller, Perf Mon, 2x I²C, Timers, 16 GPIO's, DUART
  - 16-bit Enhanced Local Bus supports booting from NAND flash memory
  - One USB 2.0 controllers Host/Device support via ULPI
  - SPI controller supporting booting from SPI serial flash memory
- High Speed Interconnects
  - 3 x PCI Express® 1.0a controllers at 2.5 GHz
- Data Path Acceleration Architecture (DPAA)
  - Based upon existing P4080 technology
  - SEC 4.2
- Device
  - 45 nm SOI Process
  - 457-pin WB TePBGA 1, 19mm x 19mm

Freescale Solutions for Networking Applications

Enterprise WLAN

- Power Over Ethernet (POE) eliminates the need to run 110/220 VAC power to wireless access points

- Single and dual core solutions allows for a wide range portfolio of end products at varying price points

- Highest performance SoC's in the industry under 3.5W

- BOM-optimized, production-ready systems from Industry-leading ODMs

Enterprise WLAN

QorIQ P1020E 533MHz-800MHz
- GigE, dual PCIe, Security
- Low-power, multicore solution 802.11n 3x3 MIMO solutions

QorIQ P1023E 533MHz
QorIQ P1017E 800MHz
- ThreeIPCIe, Security w/MACSEC
- Autonomous datapath optimized for WLAN
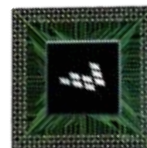
MPC8314, MPC8308 266-400MHz
- Lowest cost WLAN controller with PCI Express

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Dual-core P2020 Block Diagram

P2010
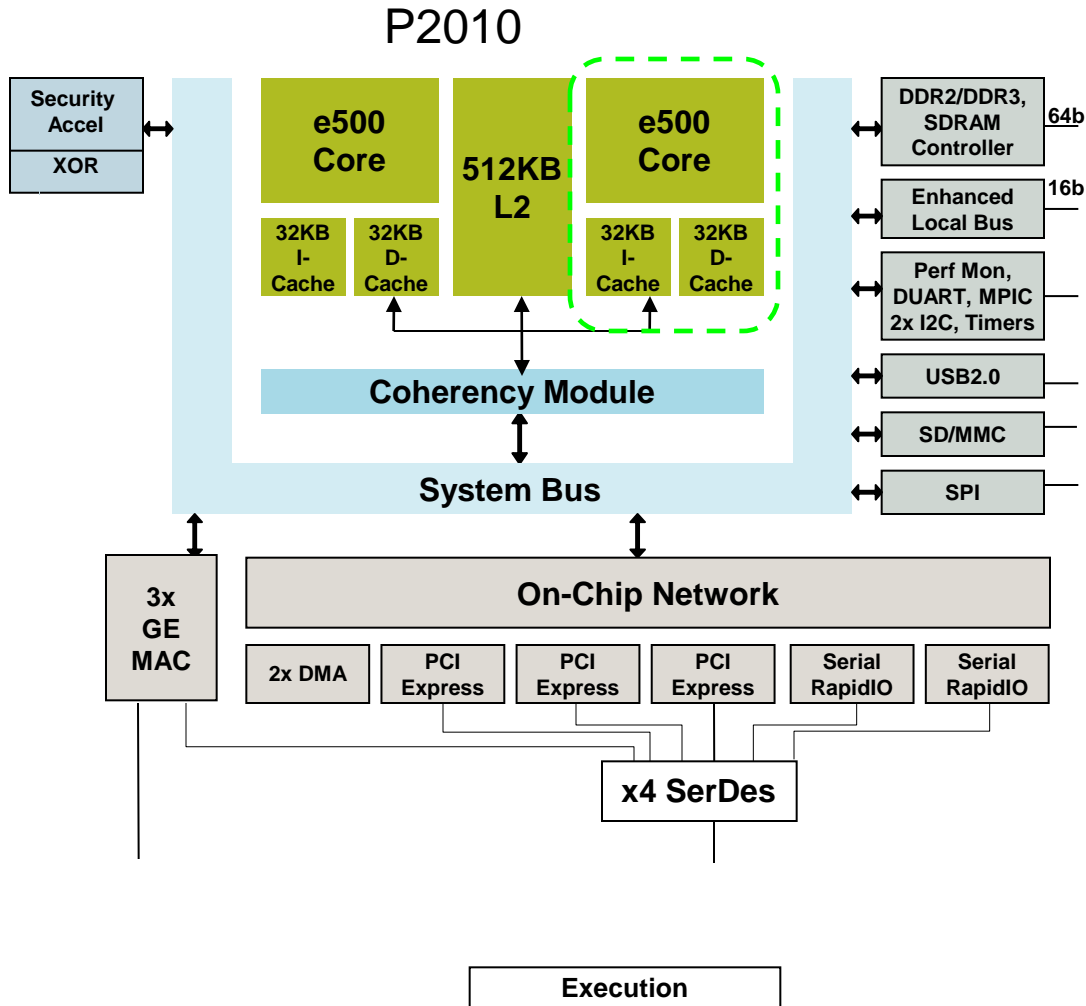
- **Dual e500 Power Architecture™ core**
  - 800 - 1200 MHz
  - 512KB Frontside L2 cache w/ECC, HW cache coherent
  - 36 bit physical addressing, DP-FPU

- **System Unit**
  - 64/32b DDR2/DDR3 with ECC
  - Integrated SEC 3.1 Security Engine
  - Open-PIC Interrupt Controller, Perf Mon, 2x I2C, Timers, 16 GPIO's, DUART
  - 16-bit Enhanced Local Bus supports booting from NAND Flash
  - One USB 2.0 Host Controller with ULPI interface
  - SPI controller supporting booting from SPI serial Flash
  - SD/MMC card controller supporting booting from Flash cards
  - Three 10/100/1000 Ethernet Controllers (eTSEC) w/ Jumbo Frame support, SGMII interface
    - Enhanced features: Parser/Filer, QOS, IP-Checksum Offload, Lossless Flow Control
    - IEEE 1588v2 support
  - Two Serial Rapid I/O Controllers with integrated message unit operating up to 3.125GHz
  - Three PCI Express 1.0a Controllers operating at 2.5GHz

- **Process & Package**
  - 45nm SOI, 0C to 125C Tj with -40C to 125C Tj option
  - 689-pin TePBGAII

QorIQ P2 Series P2040 Block Diagram
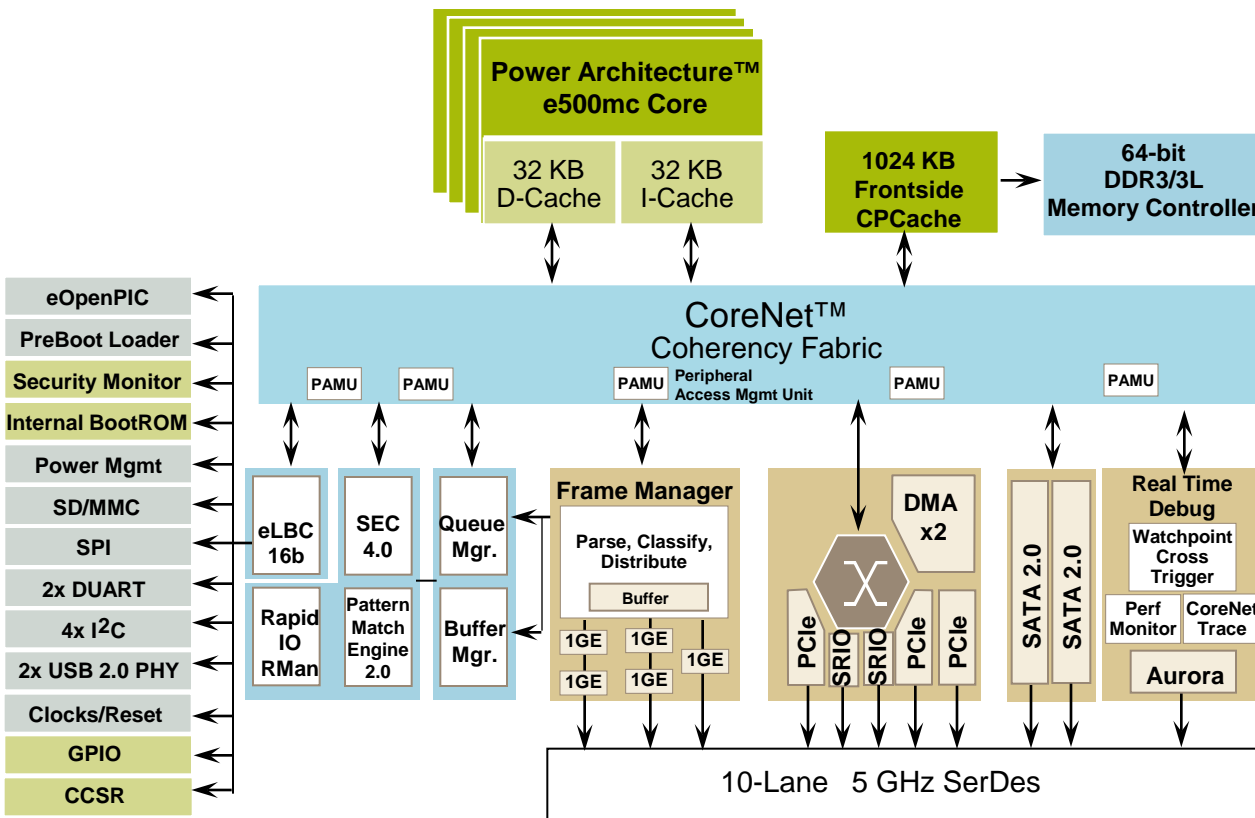
Quad e500mc Power Architecture®
- 4 cores (up to 1.2GHz)
- 1MB Shared CoreNet Platform Cache w/ECC

Memory Controller
- DDR3/3L SDRAM up to 1200MHz
- 32/64 bit data bus w/ECC

High Speed Interconnect
- 3 PCIe 2.0 Controllers
- 2 sRapidIO (1.3 + 2.1) Controllers
  - Type 9 and 11 messaging
- 2 SATA 2.0

CoreNet Switch Fabric

Ethernet
- 5 x 10/100/1000 Ethernet Controllers
  - Or 4x 2.5Gb/s SGMII
- All w/ Classification, H/W Queueing, policing, and Buffer Management, Checksum Offload, QoS, Lossless Flow Control, IEEE 1588
- Up to 5x SGMII or 4x 2.5Gb/s SGMII, 2 RGMII

Datapath Acceleration
- SEC 4.2
- PME 2.0

Device
- 45nm SOI Process
- 783-pin package
  - 23x23mm, 0.8mm pitch
- 10W thermal max (est) w/o I/O at 1.0GHz

First Samples: Q1-11
Qualification Q1-12

QorIQ P3 Series P3041 Block Diagram

Quad e500mc Power Architecture®
- 4 cores (up to 1.5GHz)
- Each with 128KB backside L2 cache
- 1MB Shared CoreNet Platform Cache w/ECC

Memory Controller
- DDR3/3L SDRAM up to 1.3 GHz
- 32/64 bit data bus w/ECC

High Speed Interconnect
- 4 PCIe 2.0 Controllers
- 2 sRapidIO 1.3 + 2.1 Controllers
  - Type 9 and 11 messaging
- 2 SATA 2.0

CoreNet Switch Fabric

Ethernet
- 5 x 10/100/1000 Ethernet Controllers
  - Or 4x 2.5Gb/s SGMII
- 1 x 10GE Controllers
- All w/ Classification, H/W Queueing, policing, and Buffer Management, Checksum Offload, QoS, Lossless Flow Control, IEEE 1588
- Up to 1 XAUI, 4 SGMII or 2.5Gb/s SGMII, 2 RGMII

Datapath Acceleration (at 1.5GHz)
- 5Gb/s IP Forwarding, 64B packets
- SEC 4.0: 5Gb/s IPSec, 1456B packets
- PME 2.0: 5Gb/s IDS, 1456B packets

Device
- 45nm SOI Process
- 1295-pin package, pin compat with P4040
  - 37.5x37.5mm, 1mm pitch
- 12W thermal max (est) at 1.2GHz
- 16W thermal max (est) at 1.5GHz

Diagram labels: Power Architecture™ e500mc Core; 128 KB Backside L2 Cache; 32 KB D-Cache; 32 KB I-Cache; 1024 KB Frontside CPCache; 64-bit DDR3/3L Memory Controller; CoreNet™ Coherency Fabric; PAMU Peripheral Access Mgmt Unit; eOpenPIC; PreBoot Loader; Security Monitor; Internal BootROM; Power Mgmt; SD/MMC; SPI; 2x DUART; 4x I²C; 2x USB 2.0 PHY; Clocks/Reset; GPIO; CCSR; eLBC; SEC 4.0; Queue Mgr.; Rapid IO RMan; Pattern Match Engine 2.0; Buffer Mgr.; Frame Manager – Parse, Classify, Distribute – Buffer; 10GE; 1GE; PCIe; SRIO; DMA x2; SATA 2.0; Real Time Debug – Watchpoint Cross Trigger – Perf Monitor – CoreNet Trace – Aurora; 18-Lane 5 GHz SerDes

freescale™ semiconductor

▶ **Next-Generation 64-bit core architecture** for higher performance, computational intensive applications

- 64-bit ISA support (Power Architecture v2.06 compliant)
- Increased addressable memory space
- Scalable up to 2.5 GHz CPU frequency

▶ **High performance classic Floating Point Unit (FPU)** for industrial applications

- Supports IEEE Std. 754™ FPU Double Precision Floating Point

▶ **Hybrid 32-bit mode** to support legacy software and transition to 64-bit architecture

- Register settings allow users to utilize 32-bit mode or 64-bit mode, easing transition to 64-bit architecture

Introducing the e5500 core

▶ Based on the e500 Architecture with 64-bit ISA

▶ Core frequency up to 2.5 GHz

▶ Up to 64 GB addressable memory space

▶ Supports up to 512KB backside L2 cache

▶ High performance classic FPU

BUILT ON
Power™

freescale™
semiconductor

QorIQ P5 Series P5020 Block Diagram
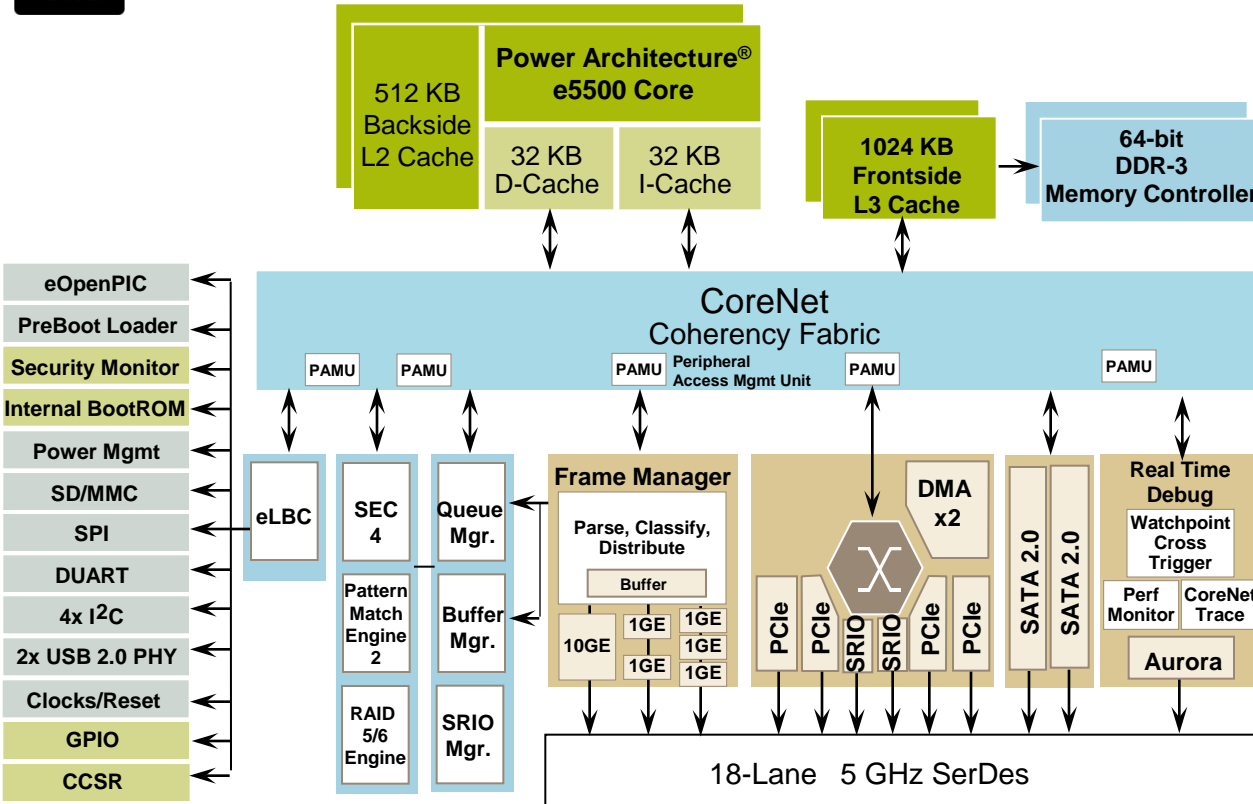
2x e5500 Power Architecture®
- 2x 64-bit cores (up to 2.2 GHz) with 512 KB backside L2 cache
- Dual 1MB Shared L3 Cache w/ECC

Memory Controller
- Dual 32/64bit DDR3/3L w/ECC up to 1.3 GHz

Ethernet
- 5 x 10/100/1000 Ethernet controllers
- 1 x 10GE controller (XAUI)

High Speed Interconnect
- 4 PCI Express® (PCIe) 2.0 controllers
- 2 Serial RapidIO® (SRIO) 1.3 + 2.0 controllers
- 2 SATA 3Gb/s
- 2 USB 2.0 with PHY

CoreNet Switch Fabric

Trusted Architecture

Data Path Acceleration Architecture
- Security Engine (SEC)
- Pattern Matching Engine (PME)
- RAID 5/6 Engine
- Enhanced RapidIO Messaging (Rman)

Device
- 45nm SOI Process
- 1295-pin package: Pin compatible with P4080 and P3041

Freescale QorIQ Platform's - Trust Architecture

Protection Against

► **Theft of Functionality** - loss of control of the system's functionality
► **Theft of Data** - where a data protection policy exists, loss of data to an unauthorized party
► **Theft of Uniqueness** - loss of product differentiation through reverse engineering, duplication, and unapproved inter-operability.

Relying on

► **Secure Boot** – start from Trusted code base or don't start at all
► **Strong Partitioning of the System** – isolation of cores from each other to provide redundancy and data corruption protection between critical functions
► **Threat detection** – internal and external security event detection
► **Secure Debug**

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MPC8308 Block Diagram

Features

- e300 up to 400 MHz
  - FPU + Dual IU
- DDR2 @ 266MHz
  - 16/32-bit (w/ ECC)
- Local Bus
  - Boot from NAND Flash support
- x2 10/100/1000
  - MII / RGMII
  - IEEE1588 support
- x1 PCI Express v1.0a
- USB 2.0 – Host / Device / OTG
- SDHC (host controller)
- Multi-channel DMA controller
- DUART, 1x I2C, SPI, GTM
- 3 dedicated GPIOs
  - Additional 21 available based on peripherals used

Package

- 473pin MAPBGA (0.8mm pitch – 19 x 19)

Power consumption

- ~1.23W typical @ 333MHz-Core, Tj 25C

Interrupt Controller | DUART I2C SPI Timers GPIO | e300 core 16KB D-Cache 16KB I-Cache | Local Bus | 16/32-bit DDR2 Controller

X1 PCI Express | USB2.0 | SDHC | 10/100/1000 w/ IEEE1588

Production ramp: NOW

Low cost embedded controller with high speed peripherals

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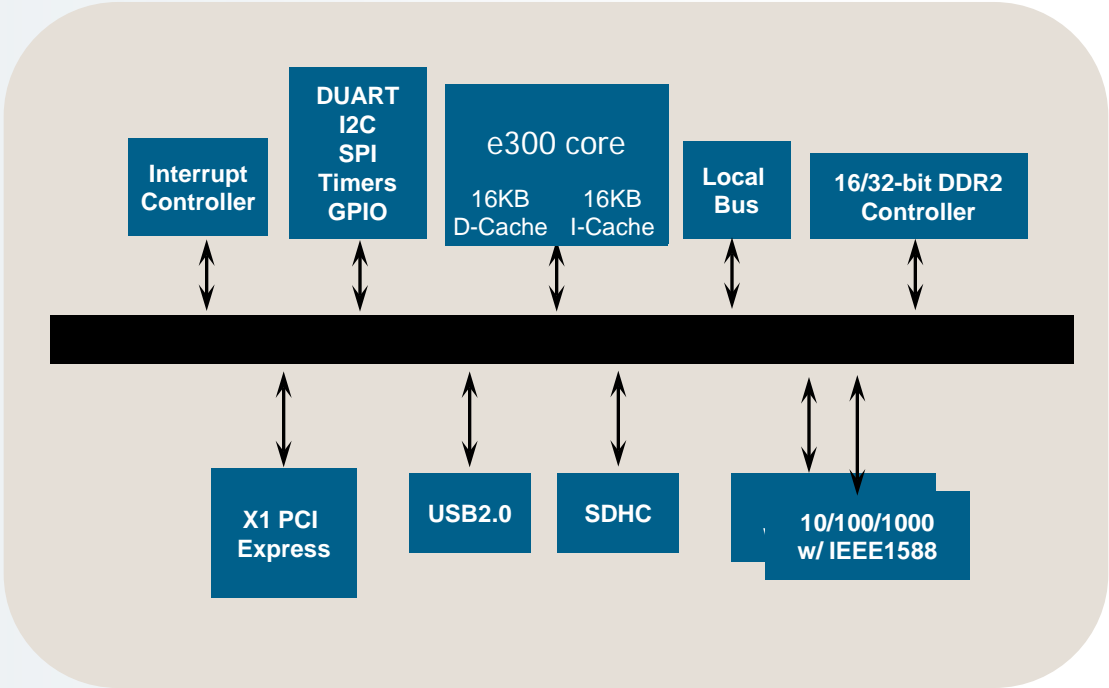semiconductor

MPC8306 Block Diagram

► Features

- e300 up to 266 MHz
  - ♦ FPU + Dual IU

- DDR2 @ 266Mhz
  - ♦ 16-bit (w/o ECC)

- Local Bus
  - ♦ Boot from NAND Flash support

- Up to x3 10/100 RMII/MII or
  - ♦ **x2 10/100 (RMII/MII) with IEEE1588 (mux'd w/ 3rd RMII)**

- x2 HDLC/TDM
  - ▪ Up to 64 channels per TDM interface

- USB 2.0 - Host / Device / OTG

- x2 DUART, 2x I2C, SPI, GTM

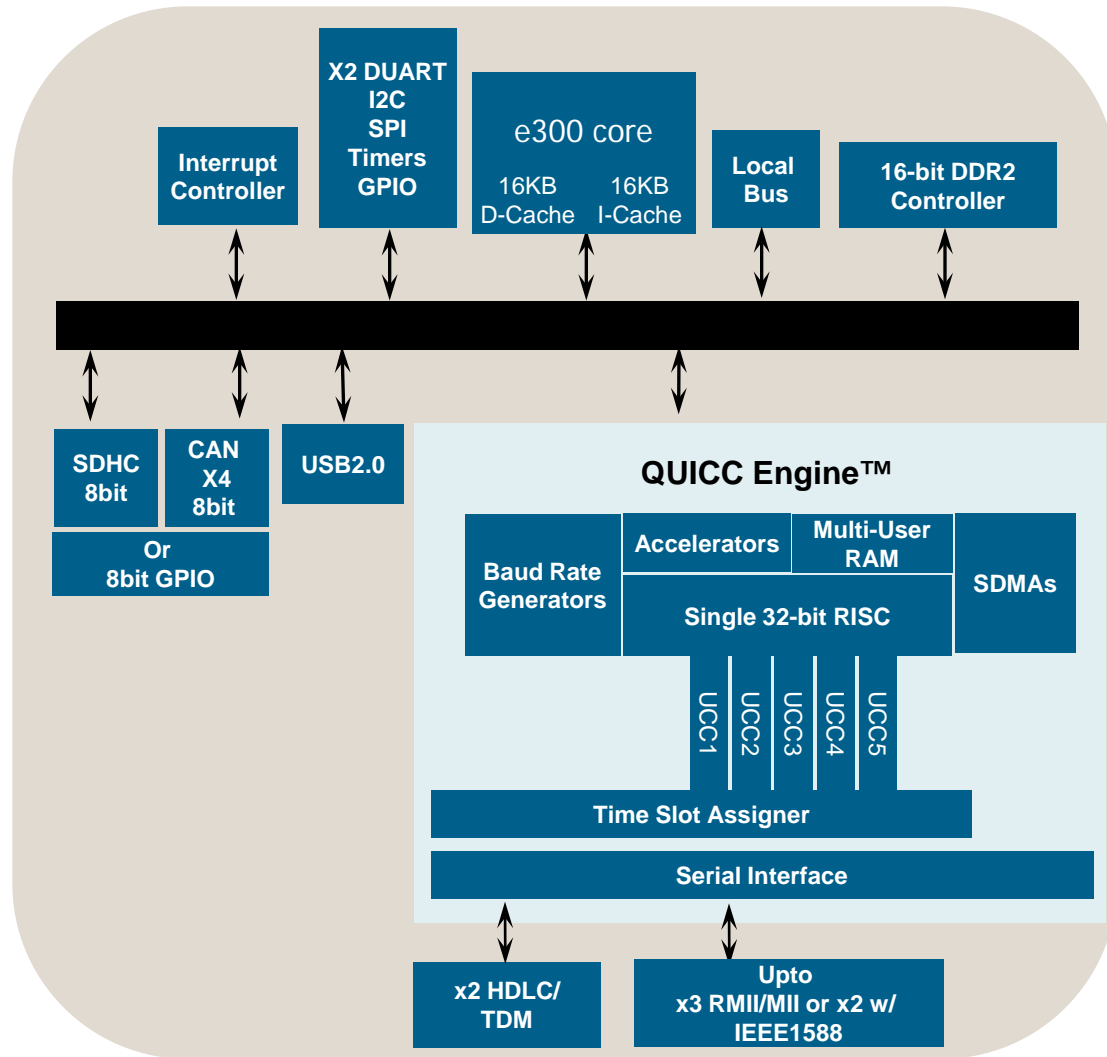- Mux'd 8 bit GPIO
  - ♦ **Mux'd 8 pins or**
  - ♦ **SDHC / x4 CAN**

► Proposed Package

- 369pin MAPBGA (4-layer; 19x19mm; 0.8mm pitch)

► Power consumption

- ~1.15W (typ) @ 266MHz-Core, 200MHz-QE, Tj 25 C

Low-cost Industrial Control / Factory Automation

20 Years of Communications Processing Evolution

AIM Alliance
Started 1991
First silicon 1992

PowerPC 603e

PowerPC 75X

Dual-core processor
MPC8641D with e600
Power cores

Dual-core with integrated content processing
MPC8572E with e500 Power core

MC68302
68K core

First PowerQUICC communications processors
Includes Communications
Processor Module (CPM)

PowerQUICC III
e500 Power core

QorIQ™
Communications Platforms

1989	▪▪▪	1994	1995	1996	1997	1998	▪▪▪	2002	2003	2004	2005	2006	2007	**2008**

Security integration with PowerQUICC line

GPON processor
Integrated
DSP + Power core

QUICC MC68360
68K core

PowerQUICC II
603e Power core

PowerQUICC II Pro
e300 Power core

Power Architecture® Host Processors
MPC7xxx
e600 core

QUICC Engine
Next-gen CPM /
dual RISC engines

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Freescale's Product Longevity Program

► Freescale has a longstanding track record of **providing long-term production support** for our products

► Freescale is pleased to provide a **formal product longevity program** for the market segments we serve

  • For all market segments in which Freescale participates, Freescale will make a broad range of devices available for a minimum of **10 years**

  • **Life cycles** begin at the time of launch

► A list of participating **Freescale products** is available at: www.freescale.com/productlongevity

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Power Architecture® Technology's Growing Market Reach - Single Board Computer Partners

Subset of a comprehensive partner ecosystem

COM Express ATCA Blades AMC Compact PCI PMC's

	ATCA	AMC	COM Express	Compact-PCI	VME	PMC's	ATX,uATX
Freescale	✓	✓	✓			✓	✓
Curtiss Wright				✓	✓		
KONTRON		✓		✓	✓	✓	
Emerson Network Power	✓	✓	✓	✓	✓	✓	
EuroTech			✓				
GE Intelligent Platforms				✓	✓	✓	
Interphase		✓			✓		
Mercury	✓	✓					
RadiSys	✓	✓					
TQ Embedded				✓		✓	

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The Ecosystem to Enable the Connected World

World Class Alliances
Strategic Technology Collaboration

Development and production systems
in standard industry form factors

e200 e300 e500 e600

SOC integrated devices
Embedded power budgets
Networking life cycles
Networking/security IP
Content Aware Packet Processing

Architecture

Alliance

Hardware
Hardware
Partners

**Power
Architecture®
Technology**

Applications
Secure
Networks

Tools/OS
Software
Partners

Optimize application-specific stacks for continual improvement in network security solutions

Value Partners: Enable faster time to market and longer time in market

Freescale – Leader in Embedded Processors

Best performance at a given power for embedded & infrastructure solutions

▶ **Continued innovation in hardware architectures**

- QorIQ Platforms: Broadest scalable family of processors in the market
- Evolution from PowerQUICC family
- Dual core @ 800 MHz at < 5 Watts
- Eight cores @ 1.5 GHz/core at 30 Watts
- StarCore DSP solutions
- Up to 1.0 GHz in 3-6 core configurations with advanced accelerators
- Industry leading integration and communication engines

▶ **Increasing software investment**

- Optimized multicore solutions
- Hybrid software simulation environment and debug tools
- Production-ready software with VortiQa solutions
- Fast time to market
- Simplified migration to multicore architecture
- More flexibility to create a uniquely differentiated product

▶ **45nm high-performance technology in production**

2-8 Core CPU

QorIQ
Communications Platforms

BUILT ON
Power

QorIQ P4080
PowerQUICC MPC8572

1-2 Core CPU

QorIQ
Communications Platforms

BUILT ON
Power

QorIQ P2020
PowerQUICC MPC837x

4-6 Core DSP

Star Core

MSC8144 DSP MSC8154
MSC8156 DSP

Service Provider

Enterprise

Consumer Access

Industrial and Aerospace