November 11, 2010

Introducing New MPC830x Cost-Effective PowerQUICC Portfolio for IP-Networking and Industrial Applications

Nikola Pejcic, FAE
Arrow Electronics

freescale™ semiconductor

MPC830x Agenda

- Portfolio overview
- Product introduction
- Product enablement
- Reference designs & demos
- Product subsystem details
- Hands on with MPC8308-RDB
- Q&A

freescale semiconductor

Introducing the MPC830x PowerQUICC II Pro Portfolio

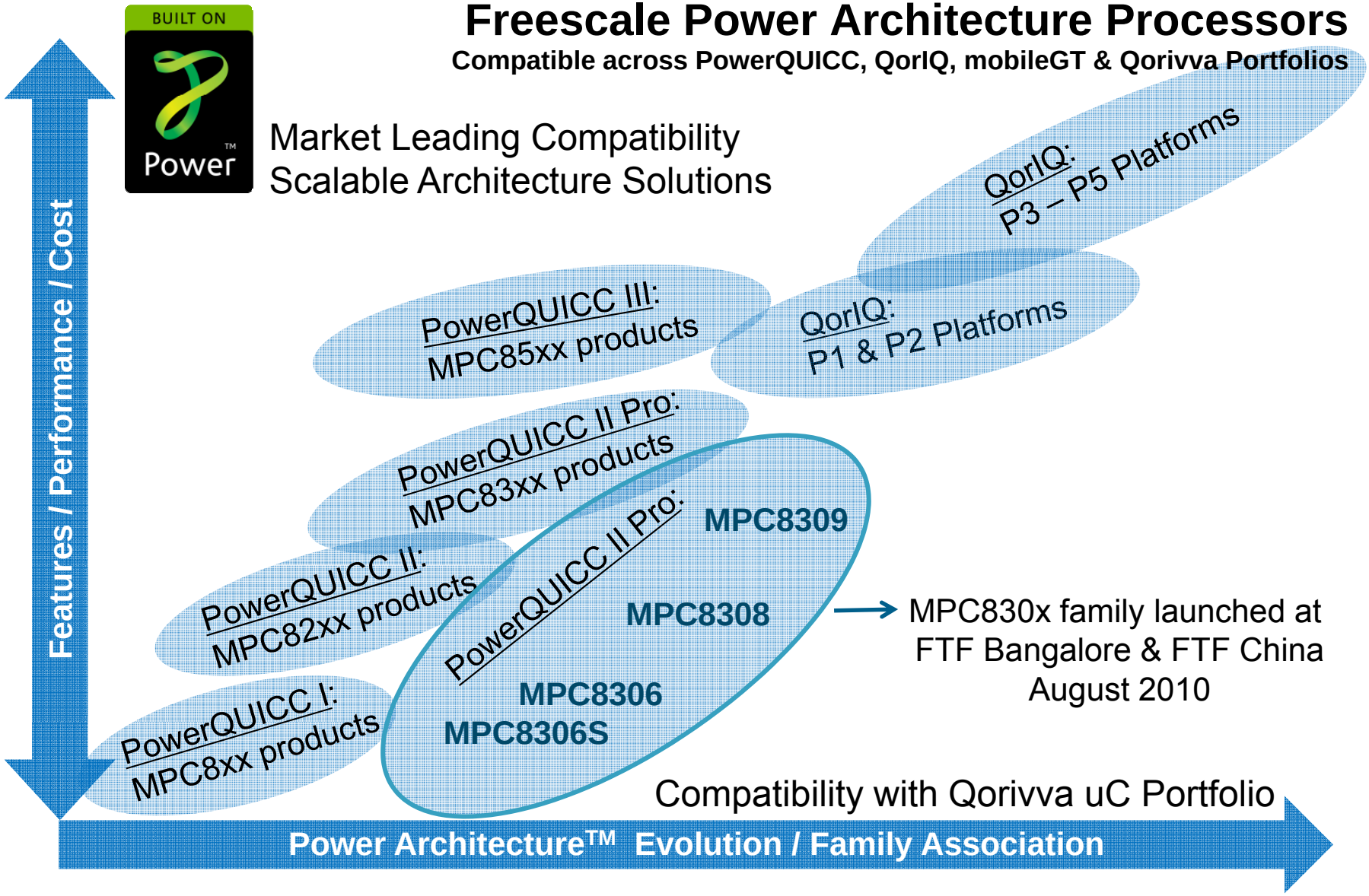
At 800 DMIPS for under **$10**, the MPC830x portfolio with high-performance industrial connectivity extends the PowerQUICC family down into cost competitive fanless small footprint networking and industrial solutions.

- MPC8308 – 266 to 400 MHz
  - Performance/price optimized MPC8308 combines 32/16-bit DDR2 memory controller supporting ECC, 2 x Gigabit Ethernet, PCI Express, USB and eSDHC targeting smart metering gateways, wireless media gateways, factory automation & test/measurement equipment. In mass production today.
- MPC8309 – 266 to 400 MHz
  - Richly featured with programmable multi-protocol QUICC Engine, CAN, USB, eSDHC, PCI and IEEE® 1588 support for networking, industrial control, factory automation and test/measurement equipment
- MPC8306/S – 133 to 266 MHz
  - MPC8306 integrates programmable multi-protocol QUICC Engine, CAN, USB, eSDHC and IEEE® 1588 support ideal for entry level industrial control, factory automation and test/measurement equipment
  - MPC8306S features programmable multi-protocol QUICC Engine (HDLC/TDM, 10/100) and USB targeting entry level networking equipment such as base station line cards and branch access gateways

All products are supported with Freescale's industrial longevity commitment

Freescale Power Architecture Processors

Compatible across PowerQUICC, QorIQ, mobileGT & Qorivva Portfolios



freescale semiconductor

MPC830x Target Applications

- Networking / Telecom
  - Entry-Level Line Cards
  - Customer Premises Equipment
  - Wireless LAN Access Point
  - VoIP PBX & Intercom Systems
  - Smart Grid Utility Access Gateway
  - Wireless Media Access Point
  - Smart Energy Gateway, Home Area Network
  - Home Surveillance Systems
  - Tele-Health Medical Gateway
- Industrial
  - Programmable Logic Controllers
  - Process Automation Controllers
  - Gateways, Bridges and Hubs
  - Intelligent I/O & Drives
  - Operator Interface terminals
  - Test & Measurement
  - Robotics

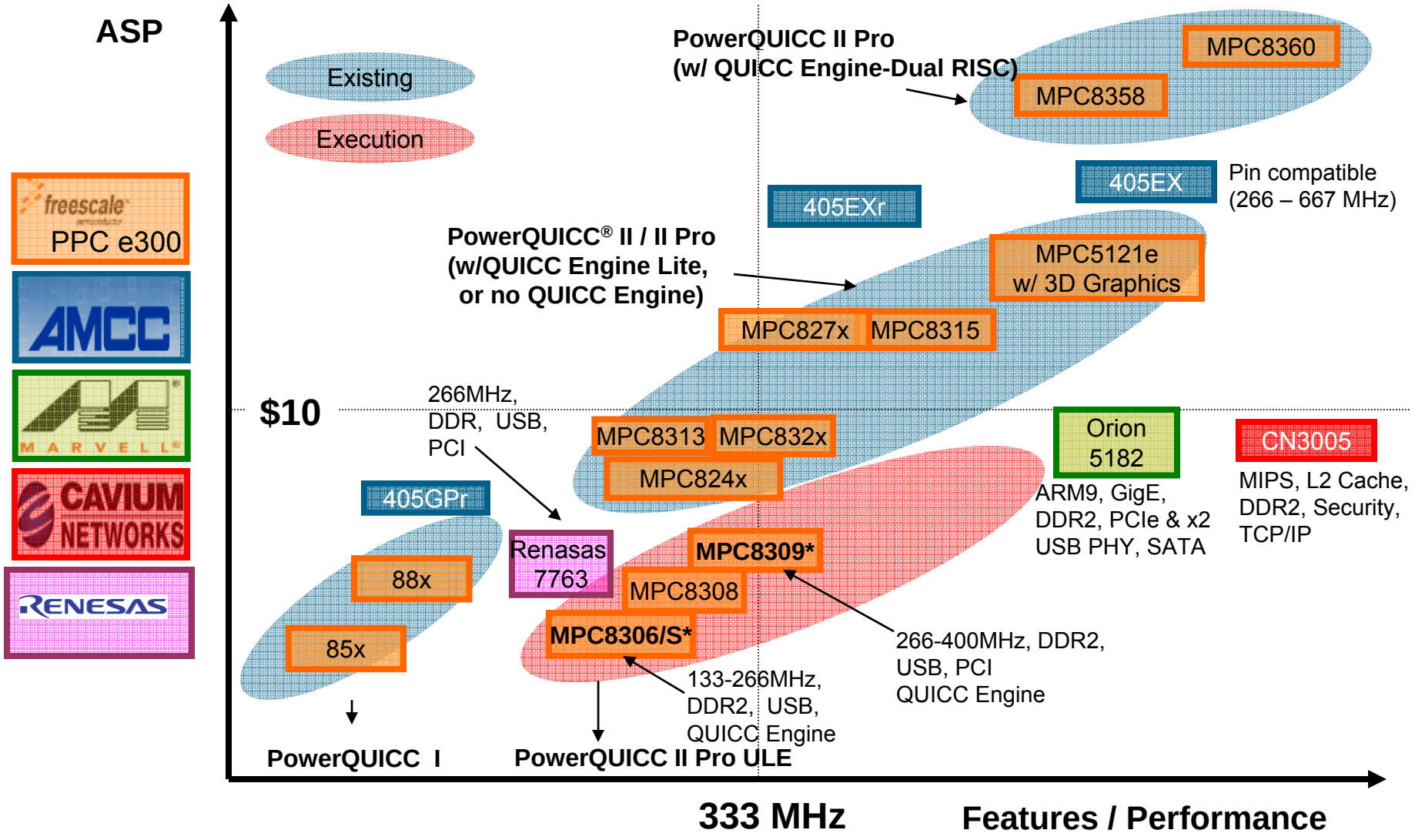
freescale semiconductor

MPC830x Value Proposition

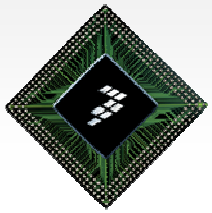
Features	Benefits
High-performance e300 core, at 1.99 DMIPS/MHz	Power® Architecture offers the most efficient instruction set which minimizes power to accomplish a given task.
Cost effective power consumption	Enables low-cost packaging and enclosure design which are small, have limited air flow and require no fans.
Comprehensive third-party ecosystem	Faster time-to-market
Migration path	Improved performance/cost migrating from PowerQUICC® or PowerQUICC II. Common architecture eases migration
Rich set of peripherals	Allows the flexibility to address a wide range of applications and reduced system cost
QUICC Engine programmability for Multiprotocol support	Can support Industrial protocols like Profibus, EtherCAT etc with uCode modifications.
Sub $10 pricing	Demonstrates that Power® Architecture can deliver very attractive price/performance ratios.

freescale semiconductor

Competitive Landscape



freescale semiconductor



MPC830x Agenda

- Portfolio overview
- Product introduction
- Product Enablement
- Reference designs & demos
- Product subsystem details
- Q&A

freescale semiconductor

MPC8308

Processing

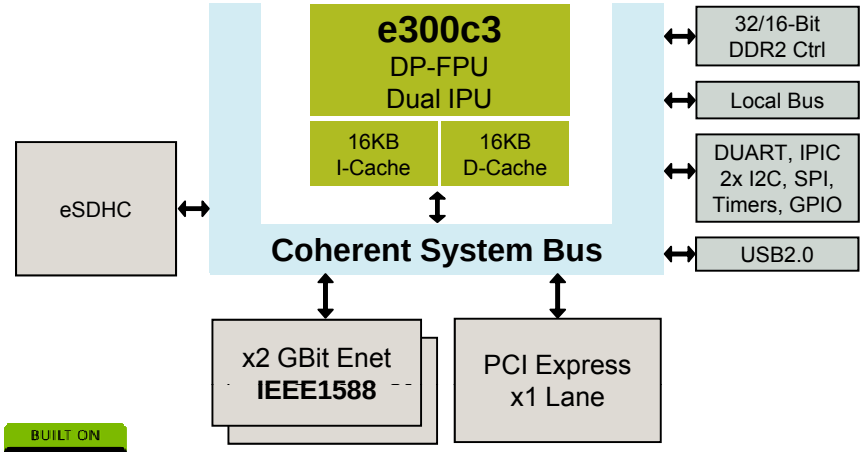
- Power Architecture™ e300c3 CPU
  - Double Precision FPU
  - 16K I/D L1 cache
- Multi-channel DMA controller

Connectivity

- x1 PCI Express Controller v1.0a
- x2 10/100/1000Mbs Gbit Ethernet MAC (MMI/RMMI)
  - IEEE1588 protocol support
- x2 128-channel HDLC/TDM
- x1 USB2.0 OTG Controller
- x1 Secure Digital Host Controller (eSDHC)
- x2 UART, x2 I2C, SPI
- 64 Muxed GPIO
  - 3 Dedicated GPIO

Memory Interface

- 32/16-Bit DDR2 Controller with ECC Support
- Enhanced Local Bus
  - Both NAND / NOR flash boot support
  - Non-muxed 25-bit addr, 16/8-bit data, 4-CS



BUILT ON Power™

- **Performance:** Upto 800 DMIPS @ 400MHz
- **Power:** Sub-1.3W @ 333MHz CPU
- **Package:** 473 MAPBGA, 19x19mm, 0.8mm pitch

In mass production
10Ku resale pricing starting at **$9.94**

Networking with Gigabit Ethernet, PCI Express, USB, eSDHC & DDR w/ ECC

freescale™ semiconductor

MPC8309

Processing

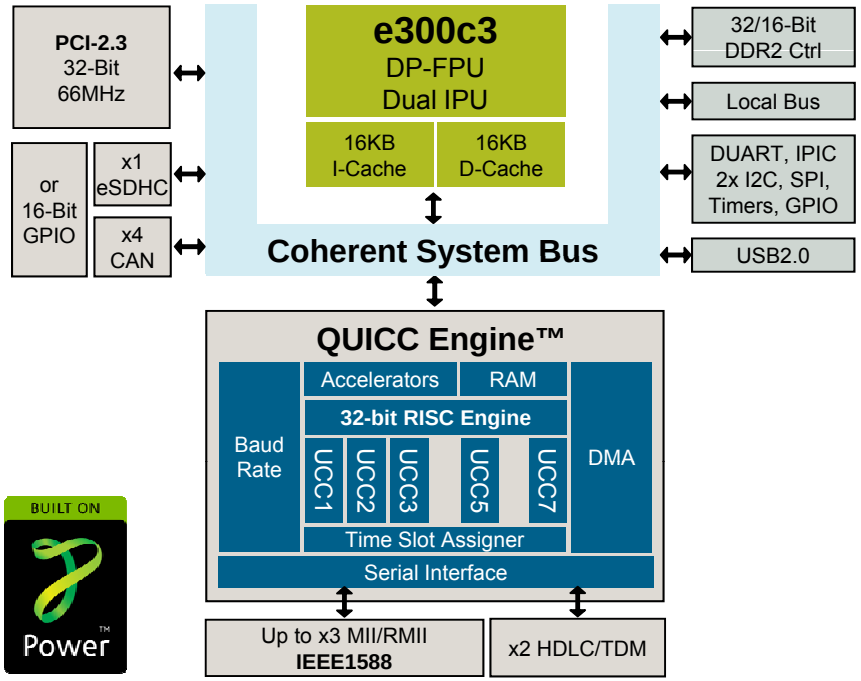
- Power Architecture™ e300c3 CPU
  - Double Precision FPU
  - 16K I/D L1 cache
- Programmable Multi-Protocol QUICC Engine™ (QE)
  - Micro-code support for industrial protocols
- Multi-channel DMA controller

Connectivity

- x1 PCI-2.3 Controller, 32-bit @ 66Hz
- x3 10/100Mbs Ethernet MAC (MMI/RMMI)
  - IEEE1588 protocol support
- x2 128-channel HDLC/TDM
- x1 USB2.0 OTG Controller
- x1 Secure Digital Host Controller (eSDHC)
- x4 CAN2.0B
- x4 UART, x2 I2C, SPI
- 64 Muxed GPIO
  - MUX'd 16 GPIO with eSDHC / x4 CAN

Memory Interface

- 32/16-Bit DDR2 Controller with ECC Support
- Enhanced Local Bus
  - Both NAND / NOR flash boot support
  - Muxed 26-bit addr, 16/8-bit data, 8-CS



- **Performance:** Upto 800 DMIPS @ 400MHz
- **Power:** Sub-1.6W @ 333MHz CPU, 200MHz QE
- **Package:** 489 MAPBGA, 19x19mm, 0.8mm pitch

Sampling Now, Qualification Feb 2011
10Ku resale pricing starting at **$8.55**

Networking / Industrial Connectivity with Fast Ethernet, PCI-2.3, CAN & DDR w/ ECC

freescale semiconductor

MPC8306

Processing

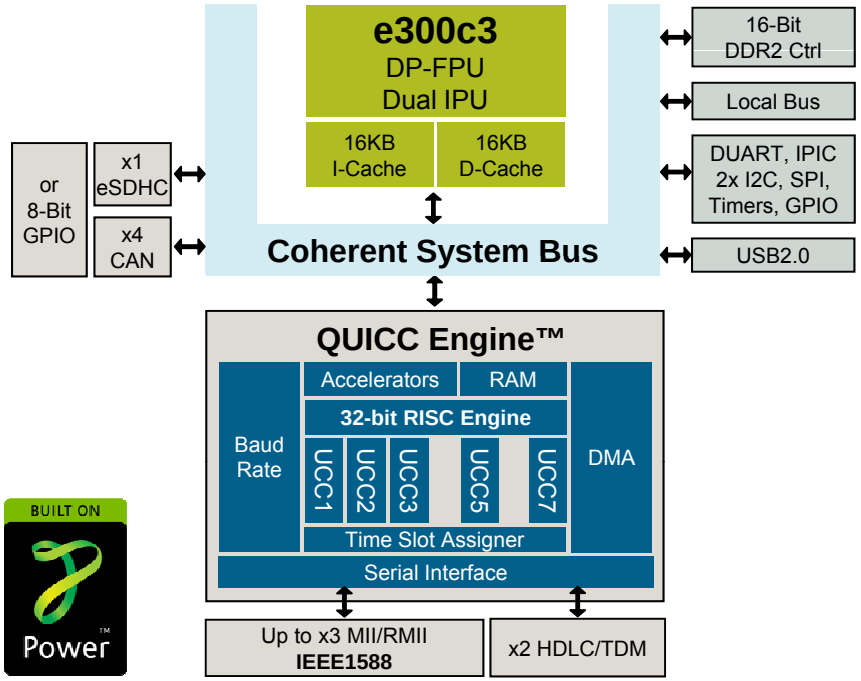
- Power Architecture™ e300c3 CPU
  - Double Precision FPU
  - 16K I/D L1 cache
- Programmable Multi-Protocol QUICC Engine™ (QE)
  - Micro-code support for industrial protocols
- Multi-channel DMA controller

Connectivity

- x3 10/100Mbs Ethernet MAC (MMI/RMMI)
  - IEEE1588 protocol support
- x2 128-channel HDLC/TDM
- x1 USB2.0 OTG Controller
- x1 Secure Digital Host Controller (eSDHC)
- x4 CAN2.0B
- x4 UART, x2 I2C, SPI
- 56 Muxed GPIO
  - MUX'd 8 GPIO with eSDHC / x4 CAN

Memory Interface

- 16-Bit DDR2 Controller
- Enhanced Local Bus
  - Both NAND / NOR flash boot support
  - Muxed 26-bit addr, 16/8-bit data, 8-CS



- **Performance:** Upto 530 DMIPS @ 266MHz
- **Power:** Sub-1.2W @ 266MHz CPU, 200MHz QE
- **Package:** 369 MAPBGA, 19x19mm, 0.8mm pitch

Sampling Now, Qualification Nov 2010
10Ku resale pricing starting at **$7.29**

Entry-Level Networking / Industrial Connectivity with Fast Ethernet, CAN & IEEE1588

freescale semiconductor

MPC8306S

Processing

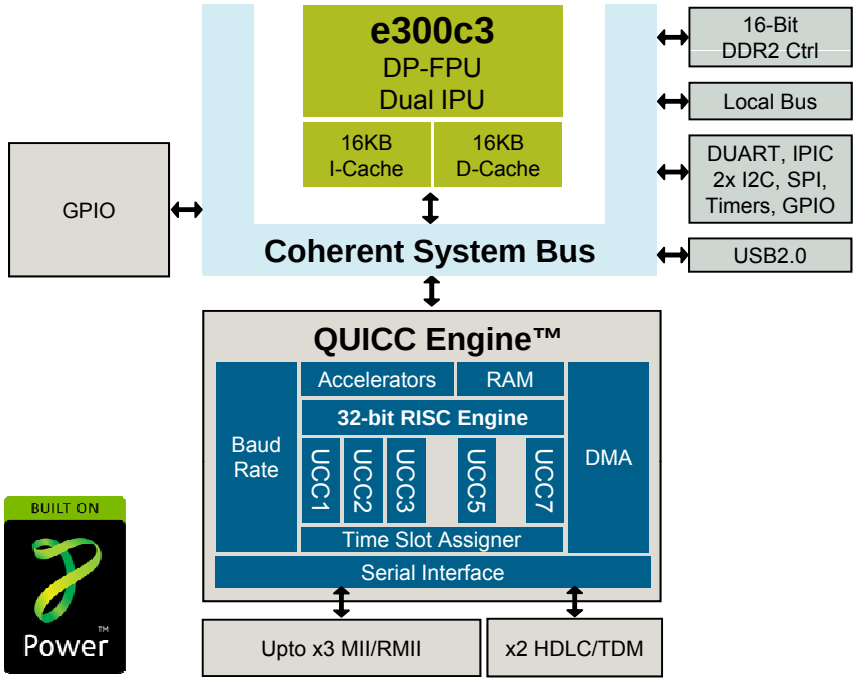
- Power Architecture™ e300c3 CPU
  - Double Precision FPU
  - 16K I/D L1 cache
- Programmable Multi-Protocol QUICC Engine™ (QE)
  - Micro-code support for industrial protocols
- Multi-channel DMA controller

Connectivity

- x3 10/100Mbs Ethernet MAC (MMI/RMMI)
- x2 128-channel HDLC/TDM
- x1 USB2.0 OTG Controller
- x4 UART, x2 I2C, SPI
- 56 Muxed GPIO
  - 8 Dedicated GPIO

Memory Interface

- 16-Bit DDR2 Controller
- Enhanced Local Bus
  - Both NAND / NOR flash boot support
  - Muxed 26-bit addr, 16/8-bit data, 8-CS



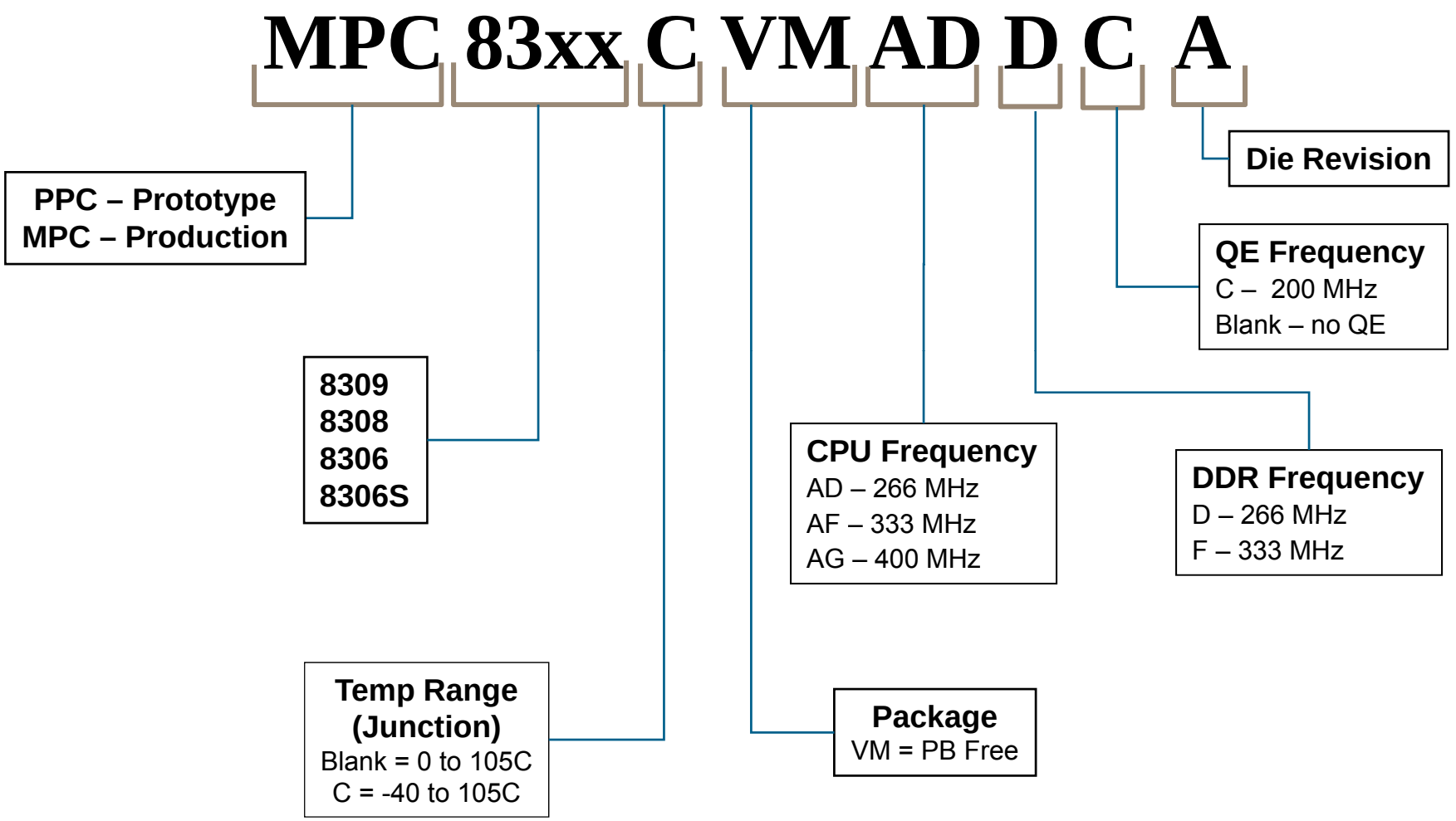
- **Performance:** Upto 530 DMIPS @ 266MHz
- **Power:** Sub-1.2W @ 266MHz CPU, 200MHz QE
- **Package:** 369 MAPBGA, 19x19mm, 0.8mm pitch

Sampling Now, Qualification Nov 2010
10Ku resale pricing starting at **$6.99**

Entry-Level Networking / Industrial Protocols with Fast Ethernet, USB, HDLC & TDM

freescale semiconductor

MPC83xx - Part Numbering Scheme



freescale semiconductor

MPC8306/S and MPC8309 Development Schedule

Planned SoC Milestones	MPC8306/S	MPC8309
General Samples Rev 1.1 (PPC)	Sept.15, 2010	Oct. 15, 2010
Qualification (MPC)	Nov. 30, 2010	Feb. 15, 2011

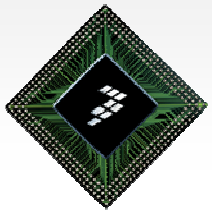
Enablement & Documentation Milestones		
SoC Factsheets	Aug. 1, 2010	Aug 1., 2010
MPC830x Eval Kit Factsheet	August 1, 2010	
Hardware Specification (NDA)	NOW	NOW
Reference Manual (Ver. 1.0)	NOW	Oct 30, 2010
(MPC830x eval kit) w/ Linux® BSP	Dec 15, 2010	Dec 15, 2010

Key Documentation available before Alpha samples
Product Brief, Hardware Spec, User manual, Errata

freescale semiconductor

MPC830x Feature Overview

	MPC8308	MPC8309	MPC8306	MPC8306S
Core Max Freq	e300c3 w/ DP-FPU 400 MHz (800MIPS)	e300c3 w/ DP-FPU 400 MHz (800MIPS)	e300c3 w/ DP-FPU 266 MHz (530MIPS)	e300c3 w/ DP-FPU 266 MHz (530MIPS)
L1 Cache I/D	16K / 16K	16K / 16K	16K / 16K	16K / 16K
DRAM Ctrl	32/16-bit DDR2 ECC Support	32/16-bit DDR2 ECC Support	16-bit DDR2	16-bit DDR2
Memory Bus	Non-muxed 25-bit addr & 16/8-bit data, 4-CS	Muxed 26-bit addr & 16/8-bit data, 8-CS	Muxed 26-bit addr & 16/8-bit data, 8-CS	Muxed 26-bit addr & 16/8-bit data, 8-CS
PCI / PCIe	PCI Express 1.0a x1	32-bit PCI-2.3 @66MHz	-	-
Ethernet	2x 10/100/1000 Mbps IEEE1588	3x 10/100 Mbps IEEE1588	3x 10/100 Mbps IEEE1588	3x 10/100 Mbps
HDLC	-	2x, Normal/Bus modes	2x, Normal/Bus modes	2x, Normal/Bus modes
USB	1x USB2 OTG	1x USB2 OTG	1x USB2 OTG	1x USB2 OTG
UART	x2	x4	x4	x4
SPI	x1	X1	x1	x1
SD/SDIO	x1	x1	x1	-
CAN2.0A/B	-	x4	x4	-
Package Body / Pitch	473 MAPBGA 19x19 mm / 0.8 mm	489 MAPBGA 19x19 mm / 0.8 mm	369 MAPBGA 19x19 mm / 0.8 mm	369 MAPBGA 19x19 mm / 0.8 mm
Power	Sub-1.3W @ 333 MHz	Sub-1.6W @ 333 MHz	Sub-1.2W @ 266 MHz	Sub-1.2W @ 266 MHz
10Ku Resale Pricing (Starting Production)	**$9.94**	**$8.55**	**$7.29**	**$6.99**



MPC830x Agenda

- Portfolio overview
- Product introduction
- Product enablement
- Reference designs and demos
- Product subsystem details
- Q&A

freescale semiconductor

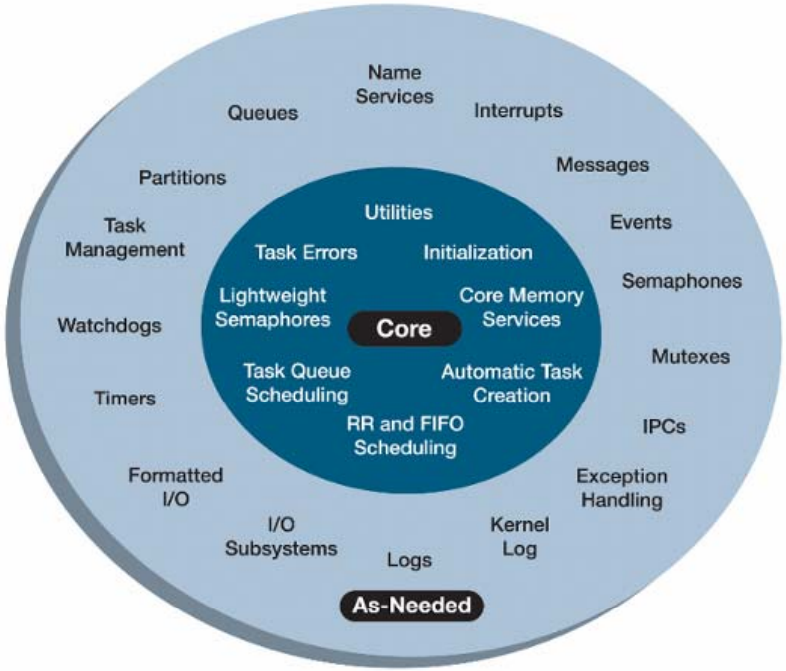
MPC830x Tools and Board Support Package

- CodeWarrior Development Studio for Power Architecture
  - Linux and Windows hosted versions available
- MPC8308 Linux Board Support Package
  - U-Boot 2009.11-rc1
  - Linux 2.6.29.6
  - DLMS Client Application
- MPC8306/S Linux Board Support Package
  - U-boot 2010.03
  - Linux 2.6.35
- MPC8309 Linux Board Support Package
  - U-boot 2010.03
  - Linux 2.6.35

▶Freescale MQX (www.freescale.com/mqx)

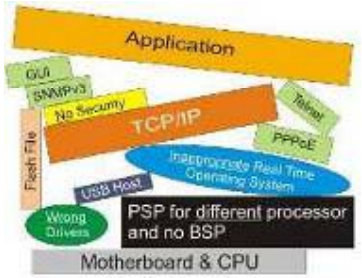
Pre-integrated & production quality

- **Portable from high-performance MPUs to low-cost MCUs**
- **Real-time critical processing support**
  - Full priority based pre-emptive scheduler
- **Real-time TCP/IP Communication Suite (RTCS)**
  - TCP/IP, FTP, Telnet, DHCP, SNMP
- **USB Host -** HID, MASS, HUB
- **USB Device** - HID, MASS, CDC
- **MS-DOS File System (MFS)**
- **HTTP Web Server**
- **PC Host Tools**
  - Application Generator Tool
  - Performance Tool
  - Remote Debug Tool
- **BSP I/O Driver: CAN, UART etc…**
- **Complete access to full production source code**
  - Customer maintain rights to source modifications

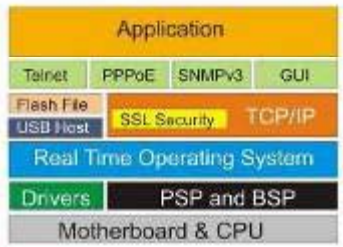


Ultimate Value: Freescale offers a complete optimized solution for hardware, software and tools on multi-architecture product families providing a best-in-class cost model (MQX is complementary with Freescale silicon purchase and backed up with a cost-effective support model)

Past Customer Problem



Freesale's Solution



Pre-production port available for MPC8308

freescale semiconductor

Freescale MQX Support Plan

	Base	Level 2 Standard	Level 2 Premium
On Line Support Page Access	Yes	Yes	Yes
Maintenance Releases	Quarterly	Immediate	Immediate
Training Discount	Regular Price	10 % Discount	20 % Discount
Response Time	No	48 Hours	24 Hours
Email - Standarized response on getting started and softw are labs	Yes	Yes	Yes
Email - Support on development of standard configuration on FSL Boards	No	Yes	Yes
Email - Detailed support on customer's hardw are, intergration and optimization of application code.	No	No	Yes
Remote Debug Sessions	No	No	10 hours
Phone Support	No	No	Yes
Term	Unlimited	6 Months	12 Months
Price	**Free**	**$3,000**	**$12,000**

- **Level 2 Standard:** For developers with relatively simple applications or in a prototyping phase. Problems must be reproducible on a standard Freescale EVB.

- **Level 2 Premium:** More complicated applications, are using communication protocols, or are on a tight time line.

freescale semiconductor

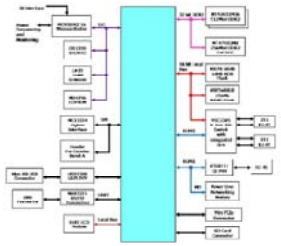
830x enablement

- **Documentation / collateral**
  - Available online
- **Enablement & Demos**
  1. MPC8308 RDB
  2. MPC830x Carried card with MPC8306/08/09 SOMs
  3. Smart Metering in the home featuring (Nucleus Metering + 8308 Energy Gateway running DMLS/COSEM stack)
  4. 8308 based Network Video Recorder (upto 12 channels of video)
  5. 8308 based Wireless Media Gateway
- **Training**
  - 830x Eval kit board bring-up using Linux BSP + Codewarrior development tools
  - Smart metering demo
  - Whitepaper

Carrier Card
Covers all MPC830x products

MPC8308/8306/ 8309 SOM

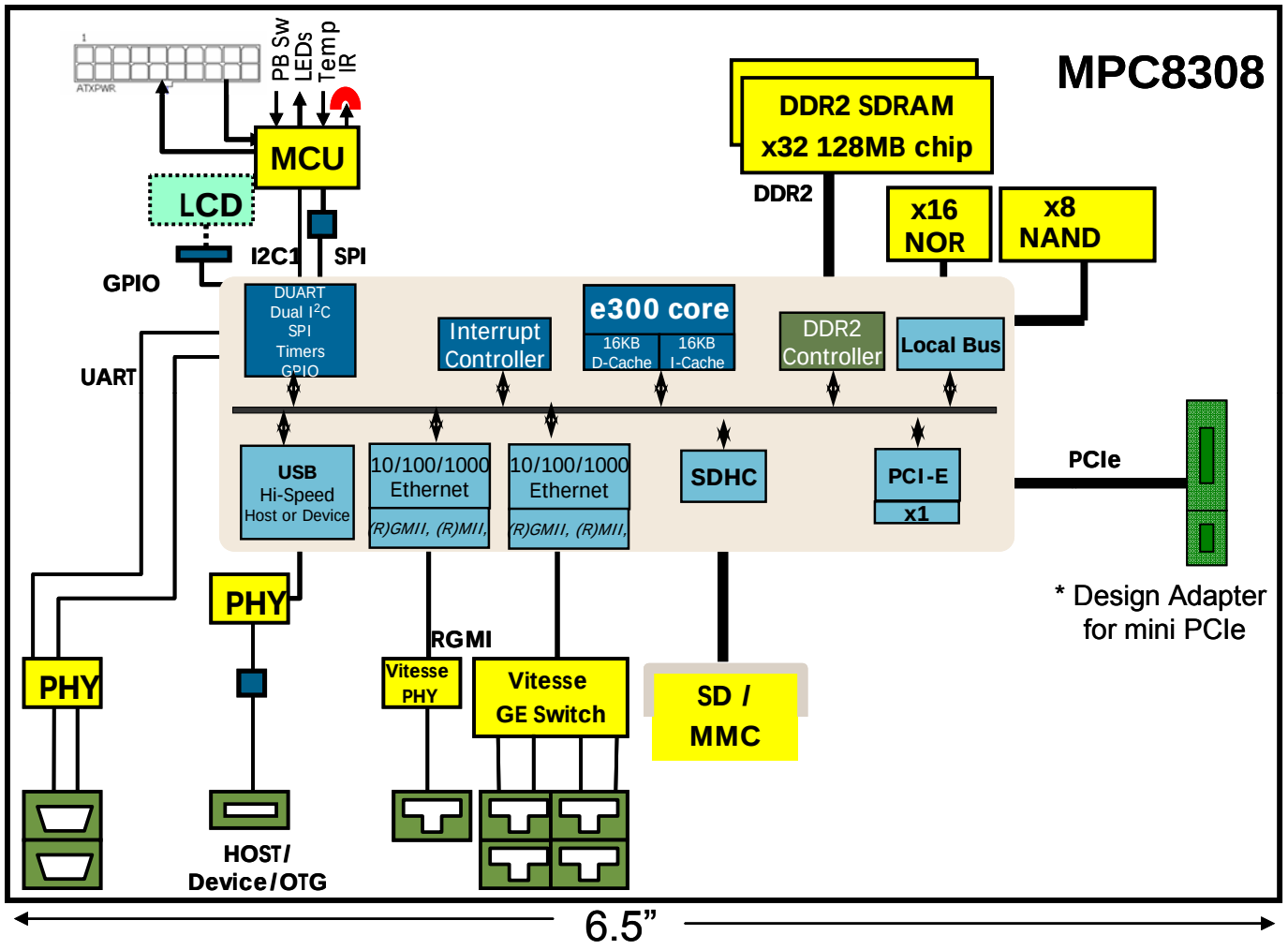
MPC8308 Linux based Wireless Media Gateway



MPC8308 based Smart Energy Gateway

freescale semiconductor

MPC8308-RDB mini-ITX low-cost eval board - $299 resale



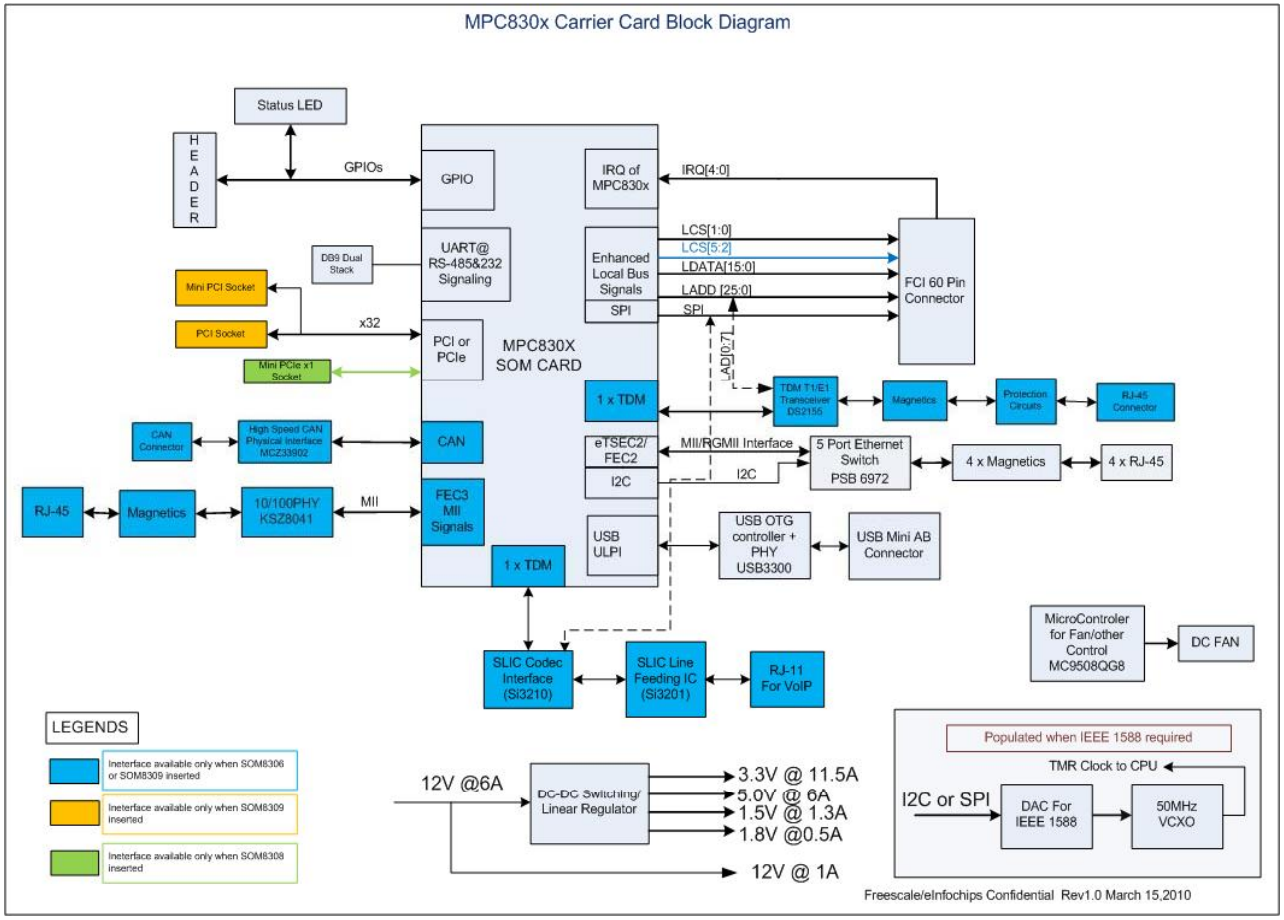
- Available NOW
- With Linux BSP, optimized drivers
- Code-Warrior: 6 month license
- MQX RTOS available October 1st

freescale semiconductor

MPC830x Eval Kit

eInfochips The Solutions People

1pc pricing	MPC8308-KIT	MPC8306-KIT	MPC8309-KIT
Carrier card + SoM KIT	$789	$759	$779



- Available for orders on freescale.com
- Schematics, Gerber files & User guide will be provided
- Will come with Linux BSP & drivers
- MQX port will be available
- SOMs MPC8308, MPC8306, MPC8309 all are interchangeable with common carrier board

Carrier card (17 x 17 cm) – mini ITX form factor SoMs (8 x 8 cm)

freescale semiconductor

Features of MPC8308 SOM Card

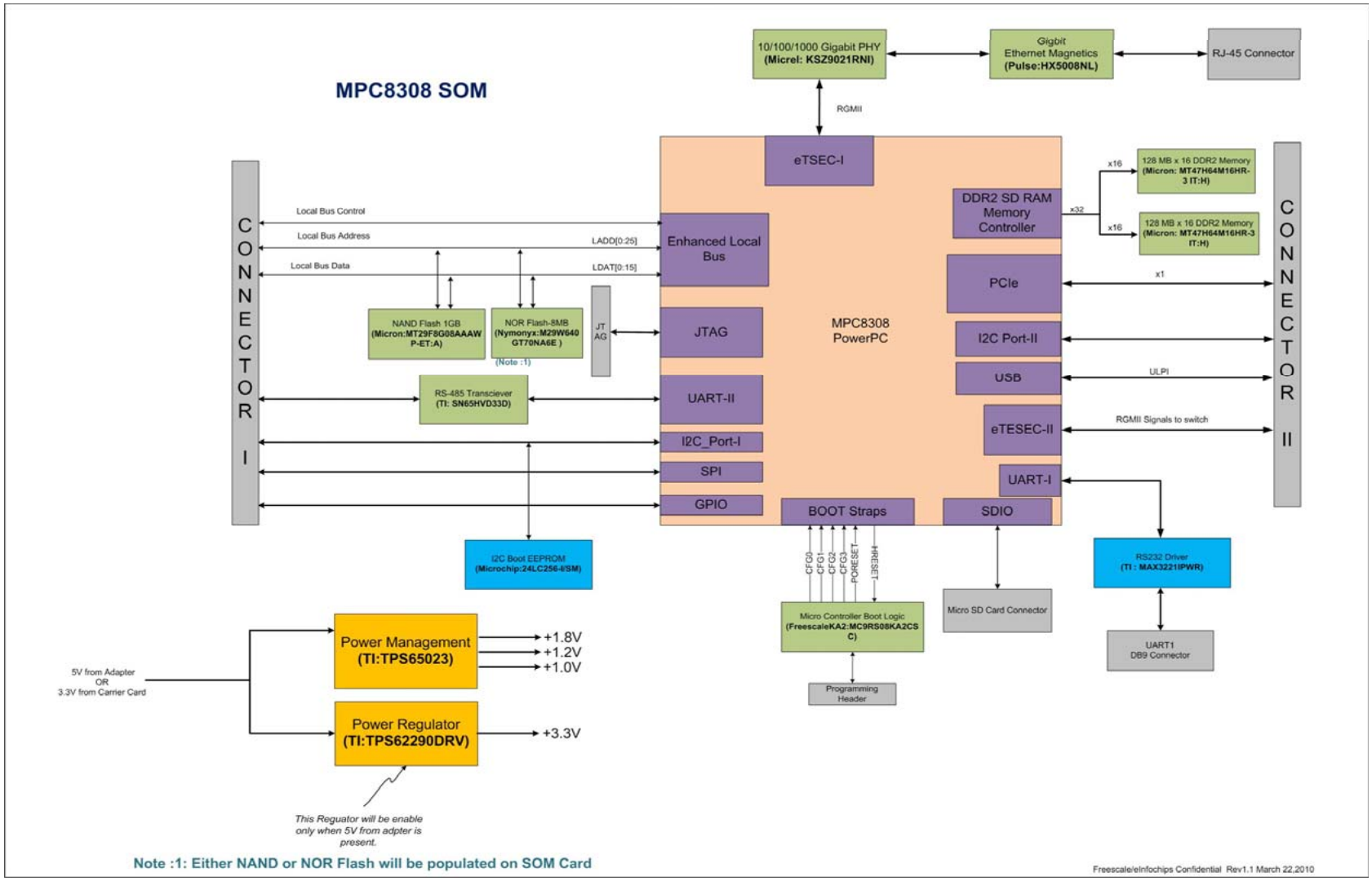
- **CPU:**
  - Freescale's PowerQUICC™ II Pro based SoC MPC8308 (e300 core up to 400 MHz)
- **System Memory:**
  - 256 MB DDR2 SDRAM, x32-bit interface @266 MHz speed
- **Boot/Program Memory:**
  - Dynamic Boot Mode control thru KA2 Microcontroller
  - 8 MB NOR flash, x16 interface
  - 1 GB NAND Flash, x8 interface
  - 256 Kbits (32Kbits x8) I2C EEPROM
- **Network:**
  - On Board 10/100/1000 Mbps RGMII Ethernet Interface
  - 2nd RGMII port available on Board-to-Board Connector
- **2x UART:**
  - On-Board RS232 connectivity through 3-Pin Header; RS232 connectivity available on Board-to-Board connector
  - On-Board RS485 Full Duplex Transceiver; connectivity through DB9 on Carrier Card
- **Storage:**
  - On-Board Micro-SD Card Connector
  - USB 2.0 Host/Device/OTG connectivity through Carrier Card
- **Board-to-Board Connectivity**
  - x1 PCIe
  - Local Bus
  - USB Host/Device/OTG
  - Ethernet (eTSEC-2)
  - GPIO & Interrupt
  - RS232 & RS485
  - IEEE1588 Timer Support
- **Power Supply: 5V @ 1.2A**
  - 5V Supply Input either through External adapter or from Carrier Card
- **Dimension: 90mm x 70mm**
- **Operating Temperature:**
  - -40 deg C to +85 deg C

Top View

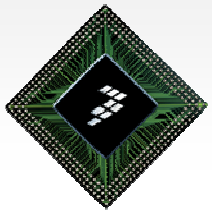
Feature matrix for 3 SoMs

Particulars	MPC8306 SOM	MPC8308 SOM	MPC8309 SOM
CPU speed	Upto 266MHz	Upto 400MHz	Upto 400MHz
DDR Memory	16 bit DDR2 upto 266/333MHz (1 Gigabit)	32-bit (w/ ECC) DDR2 @ 266MHz (2 Gigabit)	16/32 bit DDR/2 upto 266/333MHz With & without ECC
Local Bus	16bit w/NAND/NOR.I2c boot support (Muxed addr/data bus)	16bit w/NAND/NOR.I2c boot support	16bit w/NAND boot support (Muxed addr/data bus)
PCI HDLC/TDM (using QE ULE)	NA X2 TDM PROFIBUS support via ucode TDM1: T1/E1 Framer interface on carrier card TDM2: SLIC interface on carrier card	x1 PCI Express v1.0a NA	1-32 bit upto 66MHz (2.3) X2 TDM/HDLC PROFIBUS support via ucode
Ethernet (using QE ULE)	• FEC1 MII: 10/100 Network interface on SOM • FEC2 MII: 5-port switch via Carrier Card • FEC3 MII: 10/100 Network Interface via Carrier Card	• eTSEC1, RGMII: one 10/100/1000 BaseT RJ-45 interface on SOM • eTSEC2, RGMII: five 10/100/1000 BaseT RJ-45 interfaces via Carrier Card	• X3 10/100 MII/RMII (OR) • X2 10/100 MII/RMII + IEEE1588
USB	USB 2.0 high speed host/device/OTG	USB 2.0 high speed host/device/OTG	USB 2.0 high speed host/device/OTG
SDIO	YES upto 4GB	YES upto 4GB	YES
CAN	X4 YES (x1 is interfaced to transceiver on Carrier Card)	NA	X4 YES
Others	1x DUART (One RS-232 One RS-232 supports up to 115200 bps for console display other as RS-485), DMA, 2x I2C, SPI, INTERRUPT, 2x TIMERS	DUART interface:(One RS-232 supports up to 115200 bps for console display & other as RS-485)	2x DUART, DMA, 2x I2C, SPI, INTERRUPT, 2x TIMERS

MPC8308 SOM – block diagram



freescale semiconductor



MPC830x Agenda

- Portfolio overview
- Product introduction
- Product enablement
- Reference designs & demos
- Product subsystem details
- Q&A

freescale semiconductor

Smart Energy Network Gateway Demo

(Smart Energy Gateway SEG + Wireless Residential Media Gateway WMG)

Internet-enabled devices
For Remote monitoring
and Control of sensor devices
Energy – energy meters and appliances
Security – smoke/intrusion alarms, surveillance
Safety – remote health monitoring
e.g. connectivity to wearable medical monitors

110 / 220V

Smart Meter

Single phase MCF51EM256 DLMS Server implemented

3G

Zigbee SE 1.0

PLC (planned)

WiFi 802.11n

TCP/IP AP WLAN

Zigbee SE 1.0

Zigbee module

Energy Data Concentrator

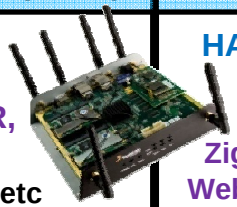
MPC8308 DLMS Client

PLC / Wireless

cameras WiFi 802.11n

Wireless Residential/Media Gateway (WMG)

MPC830x, P10xx
AP WLAN with NAS and NVR, Video Surveillance
HD movies, streaming mp3, mp4 etc and Bit-Torrent P2P, DLNA, uPnP,
Web-server (remote monitoring & control)



Smart Energy Gateway (SEG)

HAN – Home Area Network
MPC830x, P10xx
DLMS Client, Web-GUI
Zigbee Stack and AP WLAN, Web-server (remote monitoring & control of Zigbee WSN Wireless Sensor Network)

Smart Energy Network Gateway (SENG = SEG + WMG)

Smart Home (Smart, Secure, Safe)

NAN - Utility Link

830x, P10/20xx

- Utility collects usage from neighborhood meters
- Utility deliver real-time tariff rate

freescale semiconductor

MPC830x Time to Market Acceleration

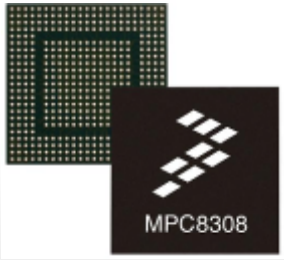
Home Energy Gateway / Data Concentrator

Reference Design Application Stacks

- Energy gateway reference design supporting ZigBee, Wi-Fi, PLC, PLM, M-Bus, GPRS etc.
- Running DLMS/COSEM Client Stack from Kalki Technologies (IEC 62056)

Turnkey solutions

MPC830x



- e300 Power Architecture running up to 400 MHz
- WAN/LAN interfaces including Gigabit Ethernet, PCI Express, eSDHC, USB, UART, SPI
- Cost-Effective wireless router solution

Optimized solution for energy gateway / concentrator

Software & Hardware Enablement

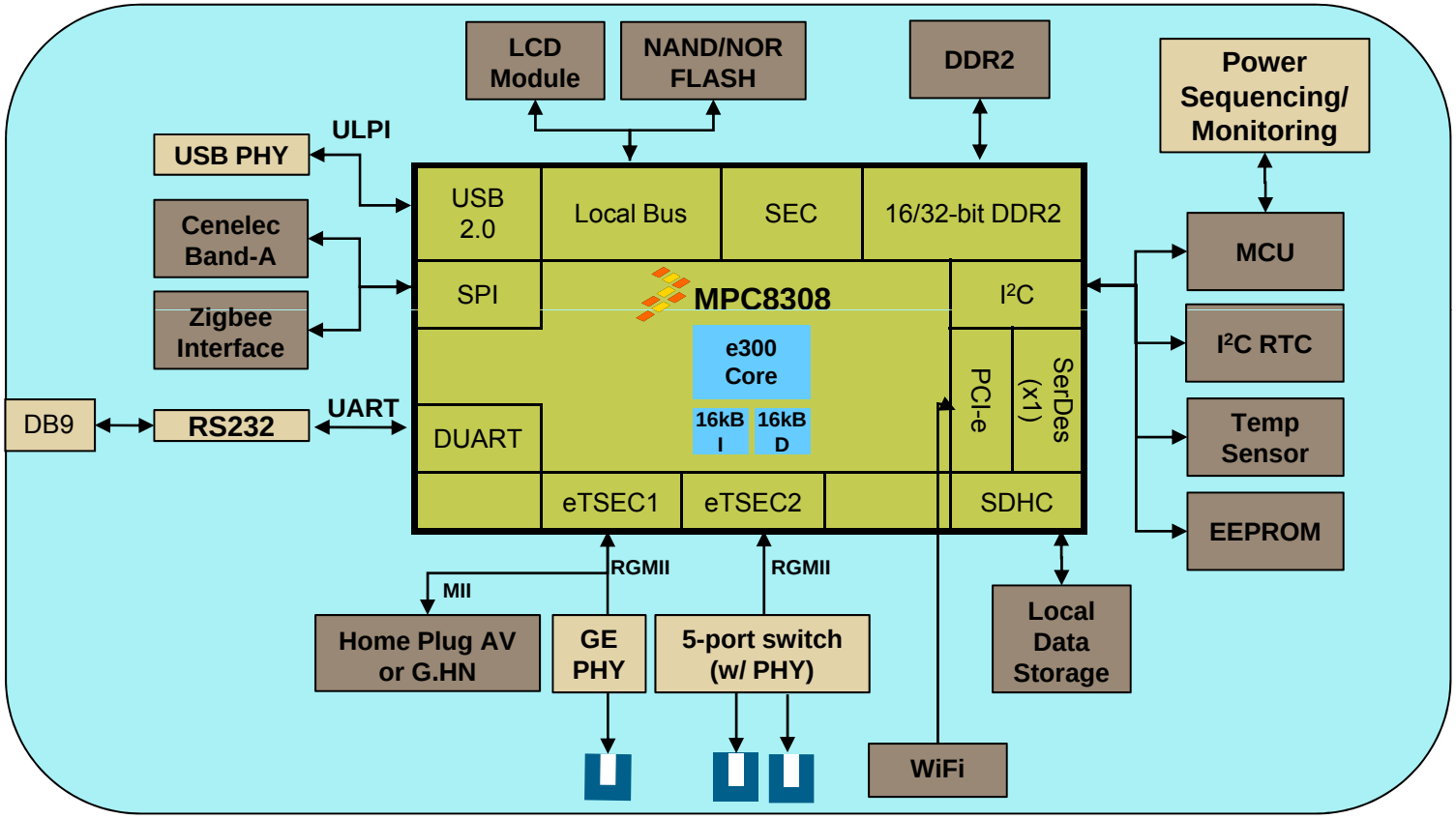
- Complimentary MQX RTOS, provides continuity with the Kinetis / ColdFire+ uC product family
- CodeWarrior 8.8 development tools available
- MPC8308-RDB ($299) running gateway applications

Rapid Prototyping / Development

Migration Path to Enterprise Class QorIQ / PowerQUICC Solutions

freescale™ semiconductor

Energy Gateway System Diagram (MPC8308)



Linux based MPC8308 Platform solution

- **11n WiFi +USB NAS GE port home gateway**
  - Ralink 1x1 11n WiFi
  - Realtek GbE 5 port switch RTL8366S(optional)
  - IdealBT NAS software
  - NTFS/FAT32 file system support
- **USB NAS**
  - Completed SOC solution, 2GE port.
  - Support both BT engine and MLDonkey engine
  - USB NAS software bundle package
  - NTFS/FAT32 file system support

freescale semiconductor

Summary

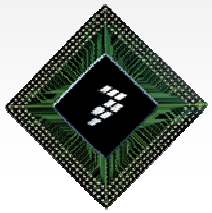
Features	Benefits
High-performance e300 core, at 1.92 DMIPS/MHz	Less MHz needed to get the job done or extra CPU headroom to perform other tasks
Best-in-class power consumption	Enables fanless, “green” and low-cost designs and improves reliability
Comprehensive third-party ecosystem	Faster time-to-market
Migration path	Improved performance/cost migrating from PowerQUICC or PowerQUICC II. Common architecture eases migration
Rich set of peripherals	Allows the flexibility to address a wide range of applications and reduced system cost
Sub $10 pricing	Reduces BOM Cost

freescale semiconductor

Freescale Product Longevity Program

- The embedded market needs **long-term product support**
  - Freescale has a longstanding track record of providing long-term production support for our products
- Freescale offers a **formal product longevity program**
  - A broad range of devices are made available for a minimum of **10 or 15 years from the time of launch**
  - Participating Freescale products are listed at www.freescale.com/productlongevity

freescale semiconductor



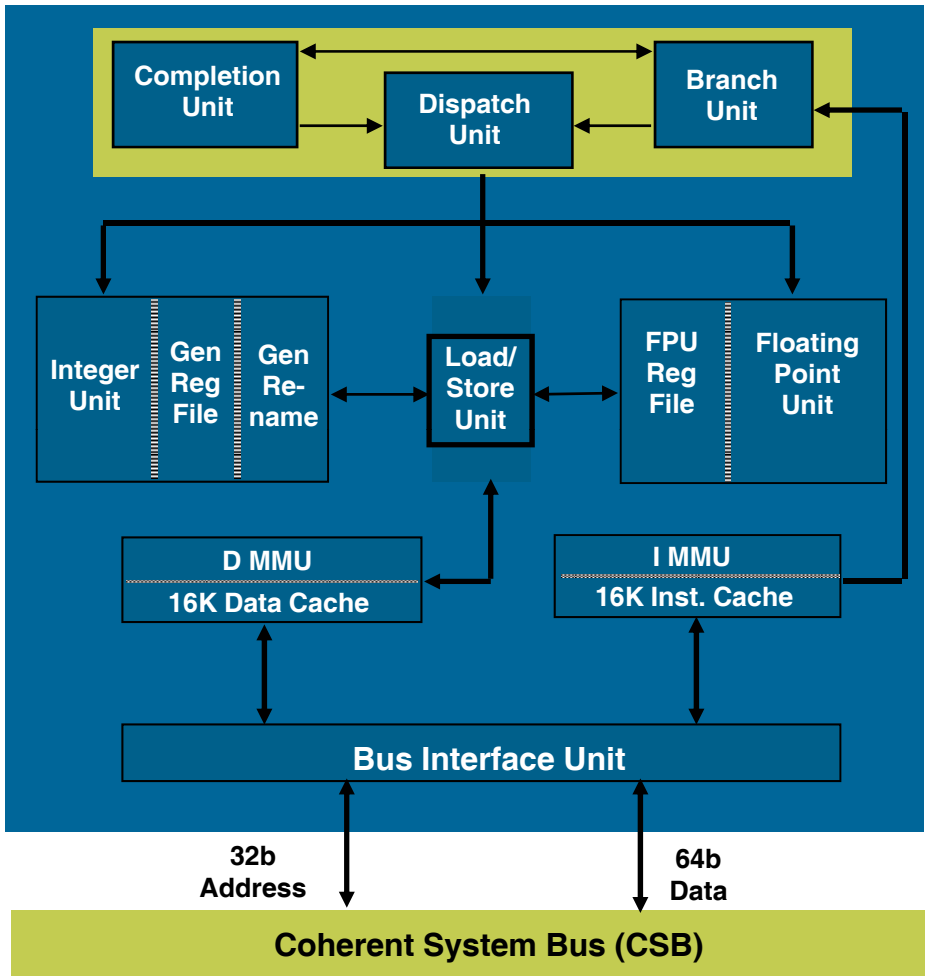
MPC830x Agenda

- Portfolio overview
- Product introduction
- Product enablement
- Reference designs & demos
- Product subsystem details
- Q&A

freescale semiconductor

e300 Core

- Enhanced core (e300) features:
  - 32-bit PowerPC Classic architecture
  - Superscalar (3 IPC)
  - 16KB I/D caches with Parity
  - Classic PPC MMUs
  - Double precision FPU
  - On-chip debug support (JTAG/COP)
- Power Management
  - Dynamic power management on decode
  - Low power static design
  - Nap, doze and sleep modes
- Performance
  - 400 MHz - 768 DMIPS – MPC8308, MPC8309
  - 333 MHz - 640 DMIPS – MPC8308, MPC8309
  - 266 MHz – 511 DMIPS – MPC830x
- New features:
  - 16Kbyte Instruction and 16Kbyte Data Cache
    - 8-way set associative Cache with Parity
  - Added performance features (extensions)
  - Up to 400 MHz operation
  - 90 nm technology



Available on all MPC830x products

QUICC Engine

- QUICC Engine Features
  - 32-bit RISC controller for flexible support of the communications peripherals
  - Separate PLL for operating frequency that is independent of system's bus and e300 core frequency for power and performance optimization
  - Executes code from internal IRAM
  - Slave bus for CPU access of registers and multiuser RAM space
  - 48 Kbytes Instruction RAM, 16 Kbytes multiuser RAM
  - Serial DMA channel for receive and transmit on all serial channels
  - Five UCCs:
    - 10/100 Mbps Ethernet/IEEE® Std. 802.3® through MII and RMII interfaces
    - HDLC/Transparent (bit rate up to QUICC Engine operating frequency / 8)
    - HDLC Bus (bit rate up to 10 Mbps)
    - Asynchronous HDLC (bit rate up to 2 Mbps)
    - 2x TDM interfaces supporting up to 128 channels, each running at 64 Kbps

Available on MPC8306/S and MPC8309

freescale semiconductor

Dual Gigabit Ethernet Ports

- Enhanced Three-speed (10/100/1000) Ethernet controllers (eTSEC)
- Dual IEEE 802.3, 802.3u, 802.3x, 802.3z, 802.3ac compliant controllers
- MII and RGMII physical interfaces
- Full and half-duplex support (1000 Mbps only supports full duplex)
- IEEE 802.3x flow control mechanism
- Buffer descriptors are backwards compatible with 8260 and 860T
- Extended Programming Model Features
  - Supports Hash, Broadcast, and Multicast address recognition
  - Supports Promiscuous mode
- Jumbo frame support up to 9.6KB
- RMON statistics support
- MII management interface for control and status
- Programmable CRC generation and checking
- Interrupt coalescing for reducing core intervention

Available on MPC8308

freescale semiconductor

Enhanced Local Bus Controller (eLBC)

- eLBC Features
  - Used to interface to Memories (NOR, NAND), SRAM, ASICs, FPGA, and any other memory mapped device
  - MPC8308:
    - Non Multiplexed 25-bit address and 8/16-bit data
    - 4 chip selects support four external slaves
  - MPC8306/S, MPC8309:
    - Multiplexed 26-bit address and 8/16-bit data
    - 8 chip selects support four external slaves
  - 16-, and 8-bit port sizes are controlled by an on-chip memory controller
  - General purpose chip select machine (GPCM)
  - Three user programmable machines (UPM)
  - NAND Flash controller machine (FCM)
  - Supports automatic, hardware-based single bit ECC
  - Default boot ROM chip select

Available on all MPC830x products

Enhanced Secure Digital Host Controller (eSDHC)

- eSDHC Features
  - Compatible to SD Host Controller Standard Specification version 2.0
  - Compatible with the MMC System Specification version 4.0
  - Compatible with the SD Memory Card Specification version 2.0, and supports High Capacity SD memory cards
  - Compatible with the SDIO Card Specification version 1.2
  - Designed to work with SD Memory, miniSD Memory, SDIO, miniSDIO, SD Combo, MMC, MMCplus, and RS-MMC cards
  - SD bus clock frequency up to 33 MHz
  - Supports 1-/4-bit SD and SDIO modes, 1-/4-bit MMC modes
  - Up to 133 Mbps data transfer for SD/SDIO/MMC cards using 4 parallel data lines

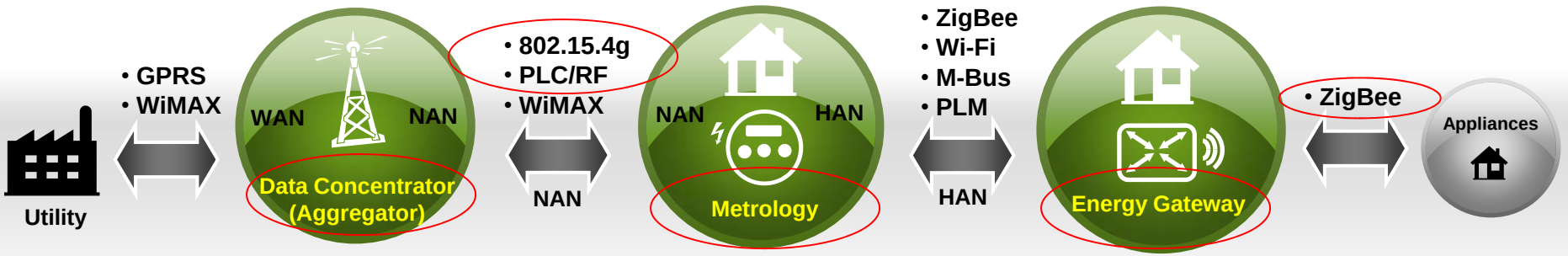
Available on MPC8306, MPC8308, MPC8309

freescale semiconductor

- FlexCAN module Features
  - Full implementation of the CAN protocol specification version 2.0B
  - Up to 64 flexible message buffers of zero to eight bytes data length
  - Powerful Rx FIFO ID filtering, capable of matching incoming IDs
  - Programmable loop-back mode supporting self-test operation
  - Global network time, synchronized by a specific message
  - Short latency time due to an arbitration scheme for high-priority messages
  - 2-Wire interface to external PHY (independent of transport medium)

Available on MPC8306 and MPC8309

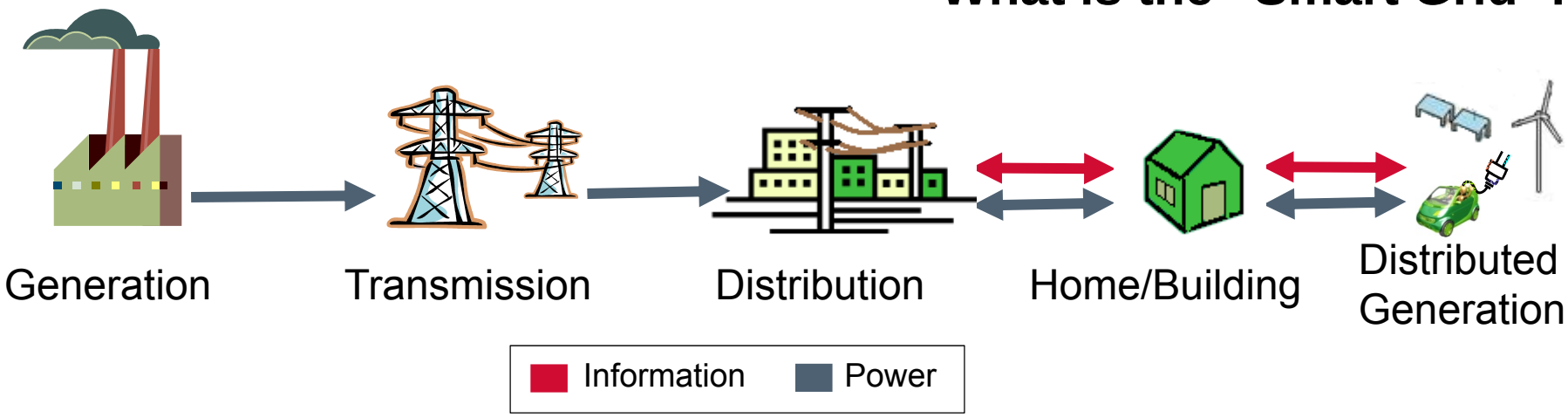
Freescale in the “Smart Grid”



Utility / NAN	Metrology	Home Area Network (HAN)
▪ Data Concentrator (Aggregator) ▪ P20x0 ▪ P10xx ▪ MPC831x ▪ MPC8308 ▪ Interfaces to NAN ▪ 802.15.4g Radio ▪ WiMAX ▪ PLM ▪ Interfaces to Utility ▪ WiMAX ▪ GPRS ▪ DLMS/COSEM library	▪ Low End Metering ▪LL/LH/AC ▪ Water, Gas & Heat ▪GW ▪ Smart 1-3ph Metering ▪EM256 ▪Joule 512 ▪Volta 1MB	▪ Smart Energy Gateway ▪P101x ▪MPC831x ▪MPC8308 ▪i.MX ▪ HAN Interfaces ▪ZigBee ▪Wi-Fi ▪GPRS ▪M-Bus ▪HomePlug Green PHY ▪ Appliance Technology ▪8-32bit MCUs & DSPs ▪Touch Sensor ▪ RF4CE (wireless control)

freescale semiconductor

What is the “Smart Grid”?



Smart Grid consist of end-to-end, bi-directional flow of energy and communication capabilities from generation to consumption to:

- Improve power reliability and quality
- Increase resiliency of the grid
- Increase capacity through optimized generation efficiency
- Allow easier use of renewable energy and distributed generation
- Reduce consumption on a per user basis
- Increase consumer choice

freescale semiconductor

Networking

8308 Smart Energy Gateway Demo

Web-based Remote Energy monitoring and control
(Bridged TCP/IP with Zigbee Wireless Sensor Network)

Main 110V power line

FSL Single Phase Smart Meter
Nucleus based with Zigbee SE 1.0 enabled

1

4

GUI monitoring & Control

3

Zigbee SE 1.0

110V power line controled by the meter

110V power line controled by the meter

2

WiFi

MPC8308 Gateway

Zigbee-based Smart Energy Metering and Smart Appliance

Zigbee SE 1.0

Zigbee HA

USB

Zigbee HA

5

HomePlug Zigbee-based HVAC

Develco SmartPlug
Zigbee SE 1.0 enabled
Thermostat control HVAC

FSLTemperature sens
Zigbee HA enabled
Battery operated

Zigbee HA

Develco Smart Plug
Zigbee HA enabled
Light Dimmer

Home Automation area
(controled by Consumer)

freescale semiconductor

MPC8308 – Smart Energy Gateway

- Smart Metering with Zigbee sensors

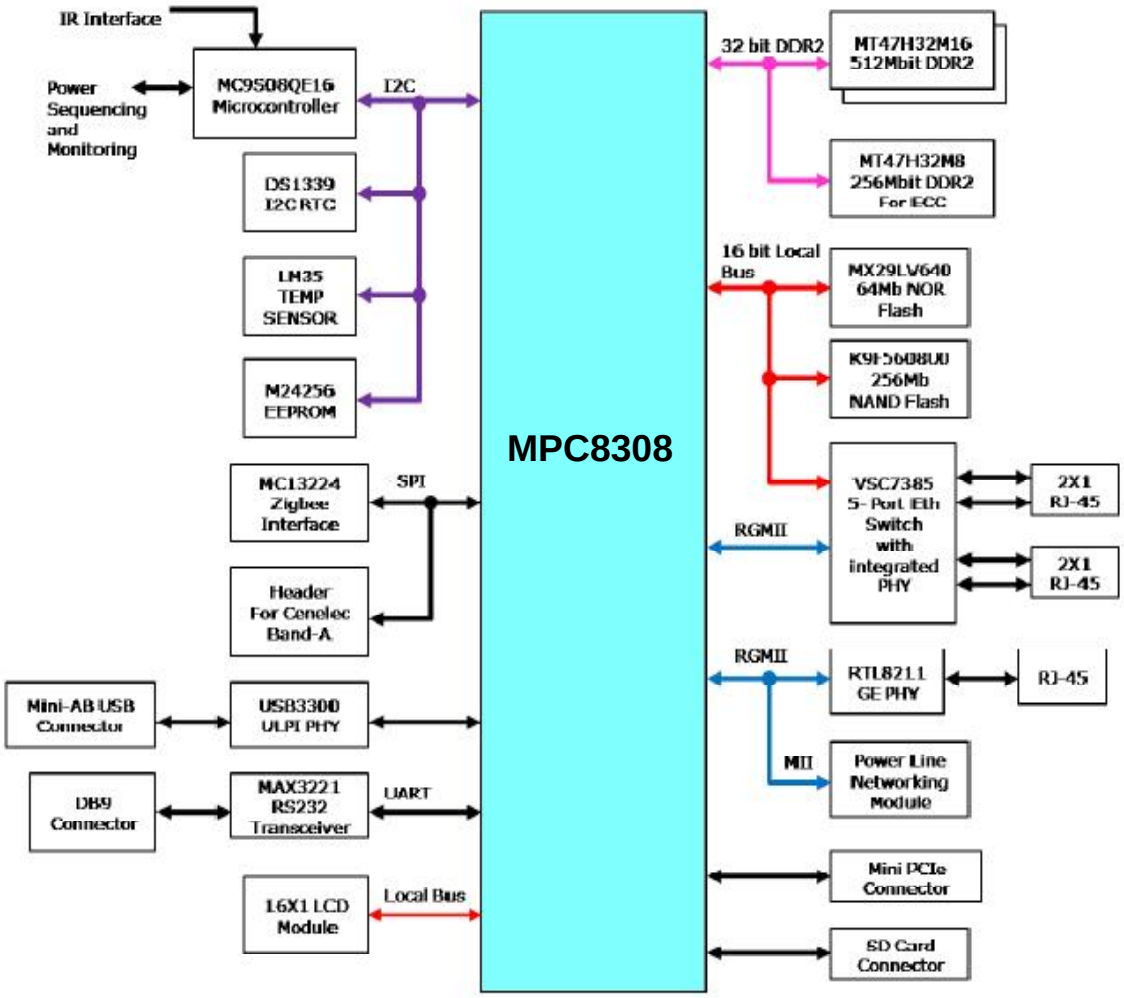
- Seamless Wireless Connectivity (TCP/IP & Zigbee Stack)
  - Remote Monitoring of meters
  - Remote Control of Smart Appliances
  - Anywhere, Anytime

- Simple GUI — Easy to Use
  - With any Smart Internet Devices (iPhone, iPAD ..)

- Integration of four software blocks
  - TCP-IP—AP/WLAN Wireless internet connect
  - Zigbee WSN — Wireless Sensor Network (WSN)
  - DLMS industry standard for utility meters
  - web-based GUI (Java) Ease of Use

freescale ™ semiconductor

Smart Energy Metering Gateway Demo



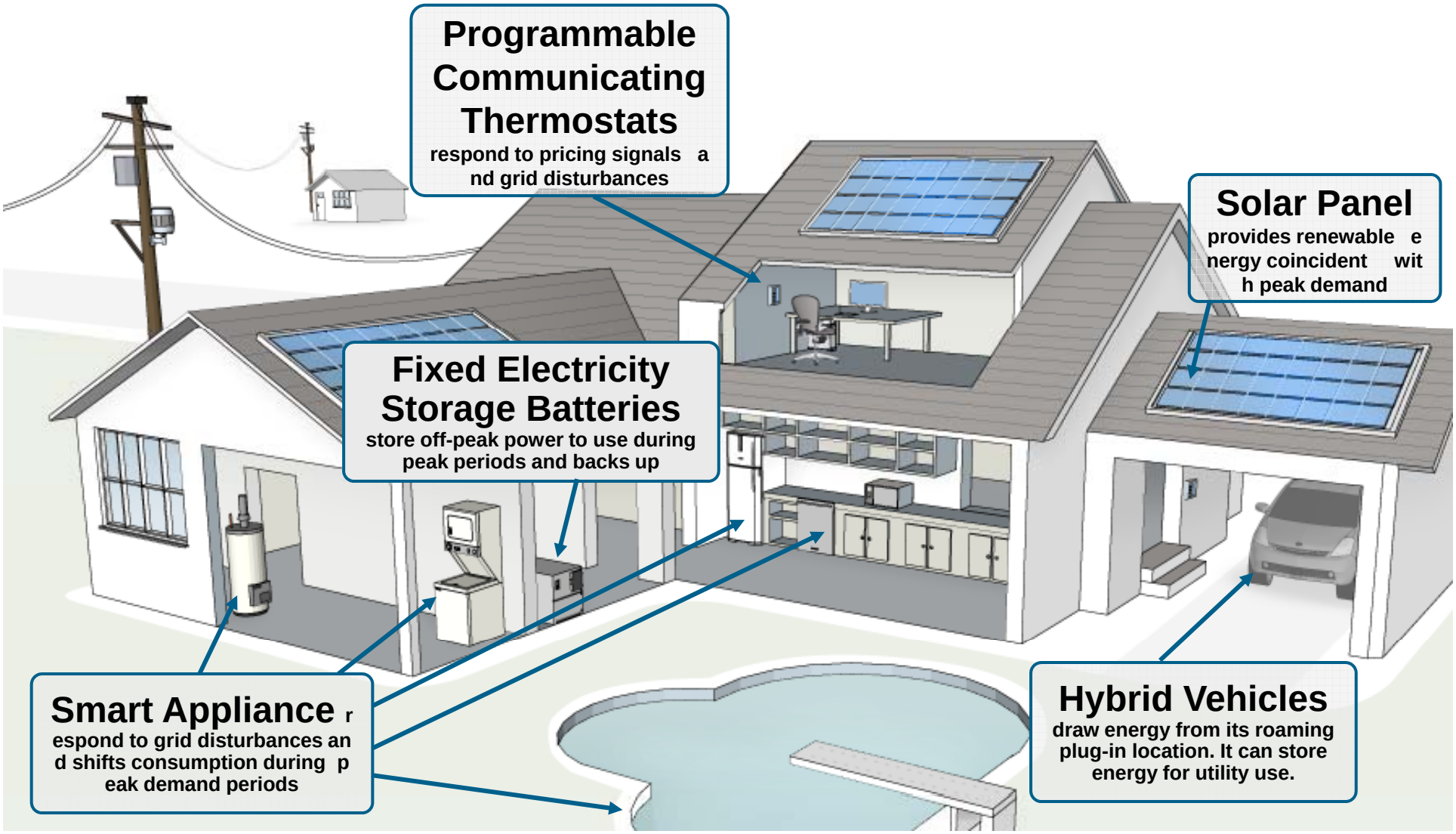
Partner with:

GDA Technologies, Inc.
accelerate your innovation™

- Running DLMS/COSEM Client protocol stack
- PPC8308-LI
- Available Demo on Demand Q4 2011

freescale™ semiconductor

Where ZigBee Enables Smart Grid



Source: wsj.com

freescale semiconductor

Smart Energy Network Gateway in the Home Area Network

Service Provider

Energy Saving Services

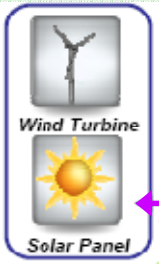
Any Internet Connected Device

Remote Monitor & Control

RF4CE
WIFI

WIFI

WIFI
ethernet
PLM



RS-485
ethernet

Home Energy Gateway

Residential Gateway

Smart Energy Network Convergent Gateway

Internet

Proprietary 868MHz RF

ZigBee SE/HA PLM

Zigbee SE
MBUS-RF/wired MBus

3G Data Concentrator

PLM

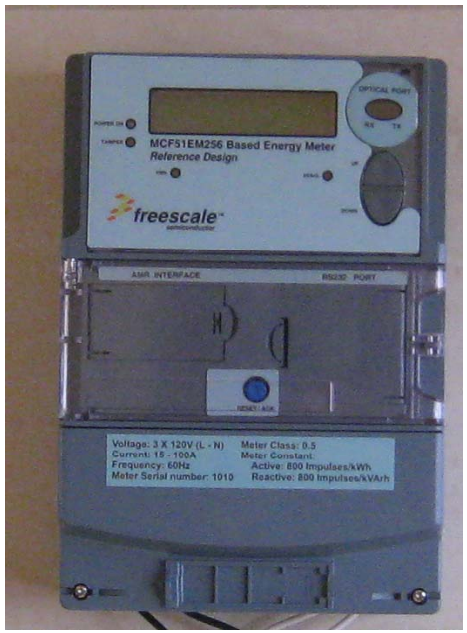
Utility

The Home Energy Gateway:

- Collects power consumption data from various sources
- Manages demand/response policies
- Controls activation/deactivation of HAN appliances
- Generates dashboards to provide feedback about power usage
- Provides control menus to control appliances
- Provides an ubiquitous link to the WAN for remote control/readout

freescale semiconductor

3-ph Power Meter Based on MCF51EM256 (Nucleus)



- Key Features
- Complete solution for 1-phase, 3-phase, 110V and 230V electricity meters for all global regions
- Full working reference design is available for loan and evaluation
- Able to achieve class 0.5 or better for active energy, 2 for reactive
- Software source code is supplied as a CodeWarrior project
  - Direct use in a metering application
- Designed and tested against: IEC 62053-22 , IEC 62053-23
  - Electro Static Discharge (ESD), tested per IEC 61000-4

This advanced single phase power meter shows the complete reference solution for next generation of power metering.

The 32-bit CFV1 family LCD-enabled microcontroller with advanced 16-bit ADC, battery backed standby RAM, Real-time clock and Programmable Delay Block allows effective design of both the single phase and multiphase power meters.

Various versions of sensing elements (and proper analog front ends) will show all typical methods of measuring voltage and current

Featured Products

- MCF51EM256
- MQX

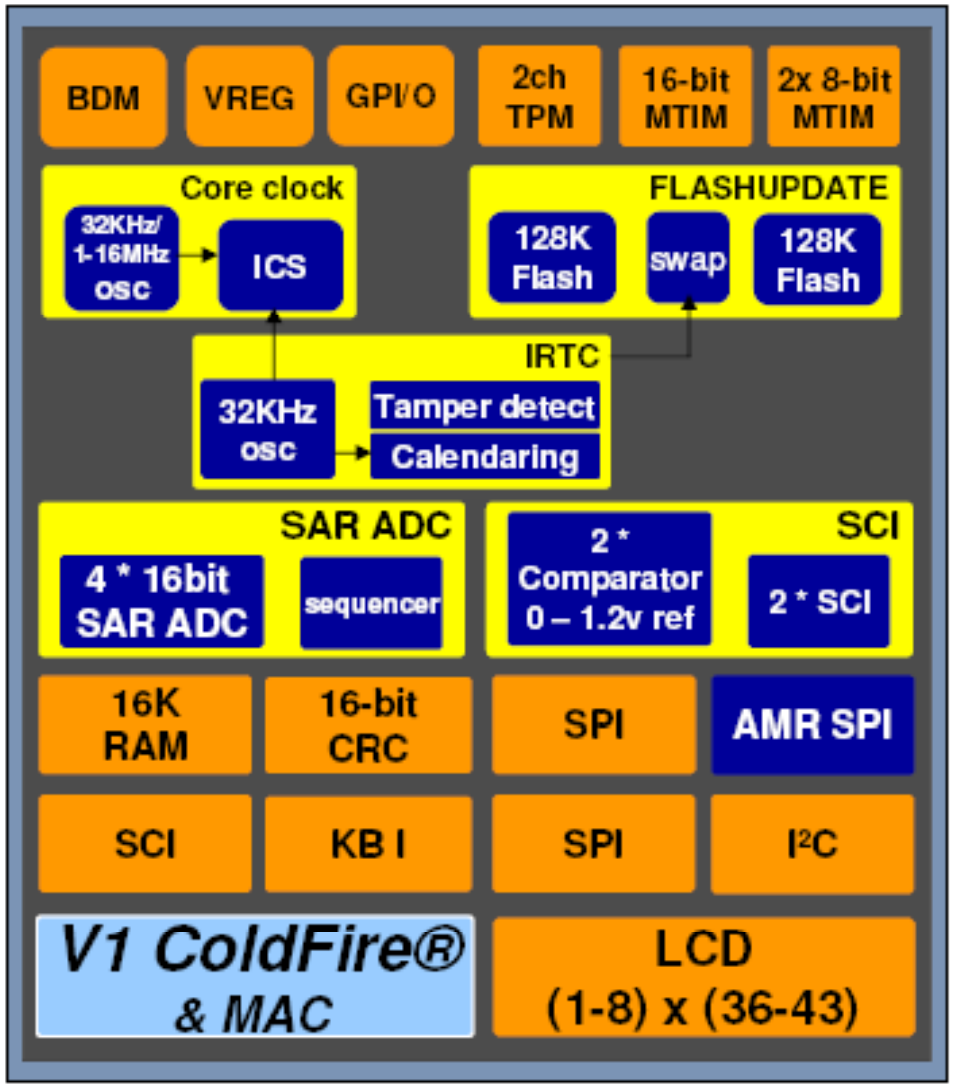
Key Markets

- Power Metering
- Automated Meter Reading
- Smart Grids

freescale semiconductor

Nucleus – MCF51EM1000/512/256/128

Metrology & RTC

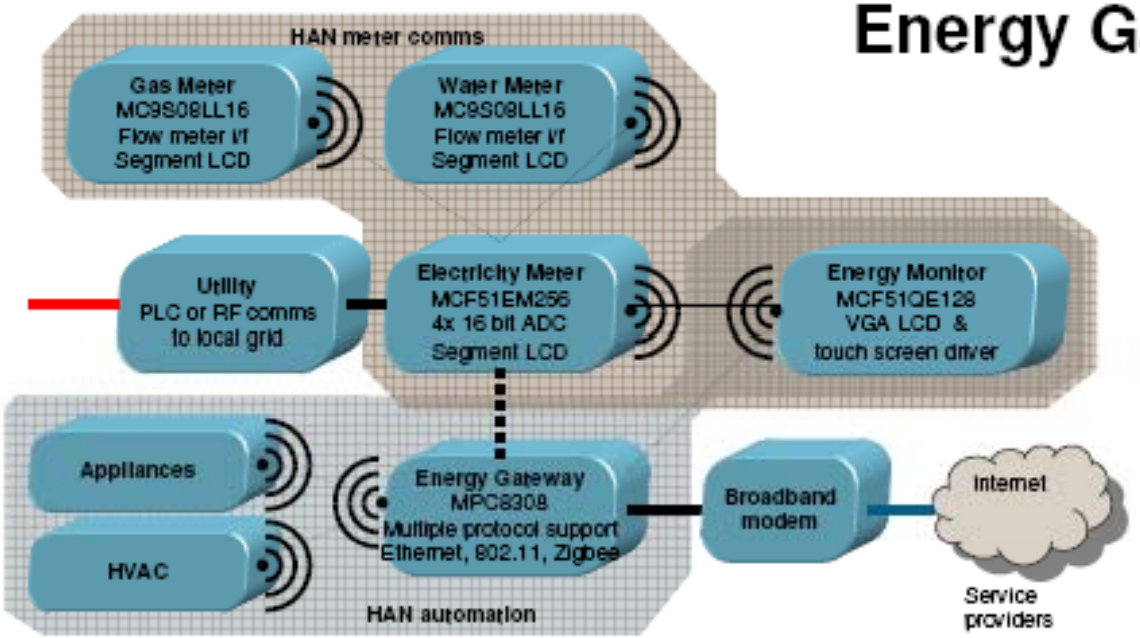


Benefits

- **Coldfire V1 Core**
  - 32-bit MAC (16x16 signed/unsigned)
  - 50MHz performance providing power calculation and communications capability
- **IRTC**
  - Own External battery supply pin and own external Osc
  - Provides a real time calendar to allow utilities to implement different tarrifs
  - Tamper detection mechanism to detect fraud
- **FLASHUPDATE**
  - Implements a robust method of code update
  - No meter readings can be lost
  - No code runaway upon power outage
- **AMR SPI**
  - Provides a 5v interface to external AMR modems
- **Comparators with internal programmable reference**
  - Allows a simpler optical interface
- **16-bit high speed SAR ADC**
  - Simultaneous conversion
  - CT Compensation
- **Low Power**
  - The industry's benchmark low power implementation
- **Packages**
  - 80LQFP, 100LQFP
- **Samples**: Aug'08, **MC Qual**: Apr'09, **Prod**: May'09

freescale semiconductor

Energy Gateway using MPC8308



- Optimized meter measurement; electricity, water, gas
- Energy gateway for access to services and bridge between meters and home area network (HAN)
- Low cost energy monitor with integrated ZigBee PRO

Supplied by Freescale

Metrology, connectivity, user interfaces and appliance controller all integrated into a smart home system

- MCF51EM256 – optimized high accuracy metrology
- MC9S08LL16 – low power metering
- MPC8308 – communications and security
- MC13224V – 2.4Ghz RF , ZigBee PRO SE
- MCF51QE128 – low power, low cost 32 bit controller

- Reference designs demonstrate match to each application needs
- Future proofed connectivity products
- Roadmap supporting future system needs
- Long term expertise in appliances and metrology
- FSL industrial lifetime and auto quality provide longevity

freescale semiconductor

More Information

MPC830x family:

- MPC8306/S Product Summary Page
- MPC8308 Product Summary Page
- MPC8309 Product Summary Page

THANK YOU !

freescale semiconductor