

# Designing the LS1043A Residential Gateway

May 18, 2016

# Overview

The LS1043A Residential Gateway (RGW) was created to demonstrate the full capability of the LS1043A.

The platform supports full 10GE performance to future-proof next generation products.

The RGW is delivered as a complete Software and Hardware Solution.

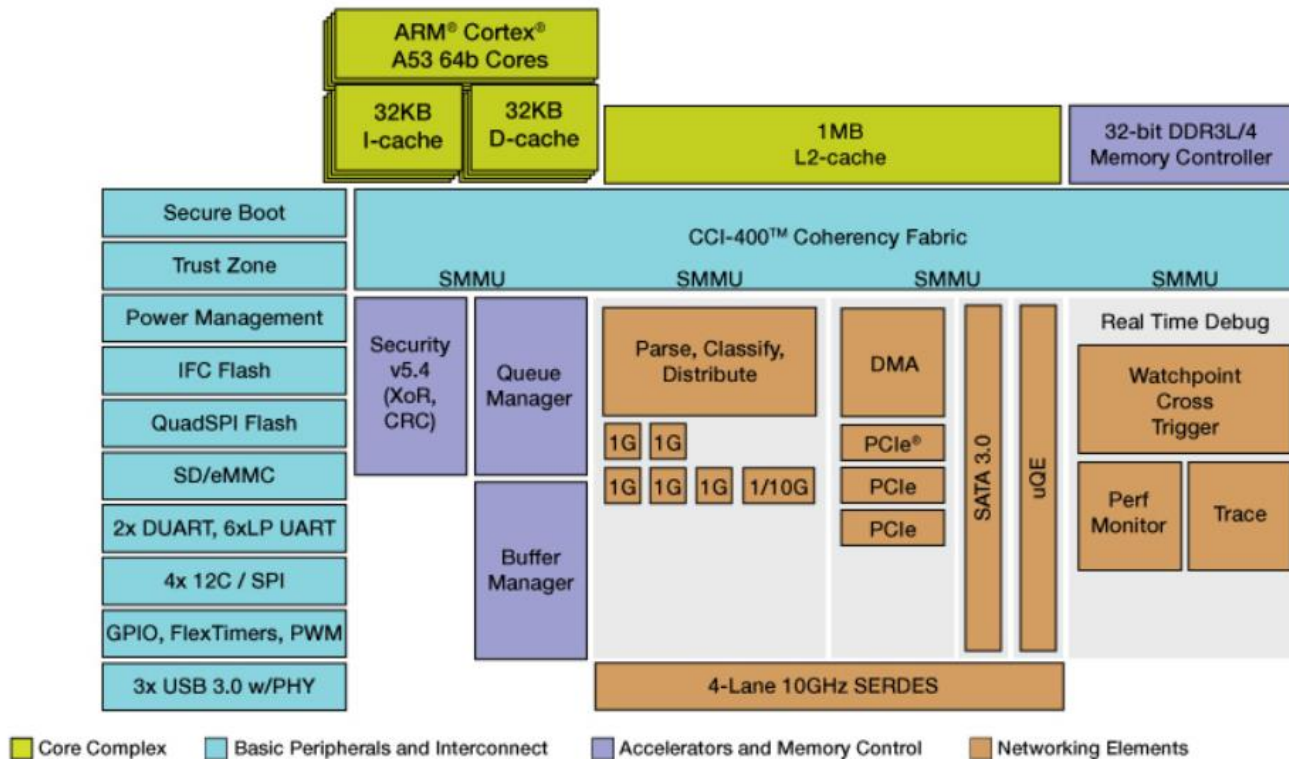
# Accelerate

- Differentiated Hardware Development
- Differentiated Software Development
- Time to Market

# LS1043A

# Block Diagram

QorIQ LS1043A Processor Block Diagram



# What's new

- Quad Core A53 (Dual Core – LS1023A)
- DDR3L and DDR4 support
- IFC – the new local bus
- 10GE support

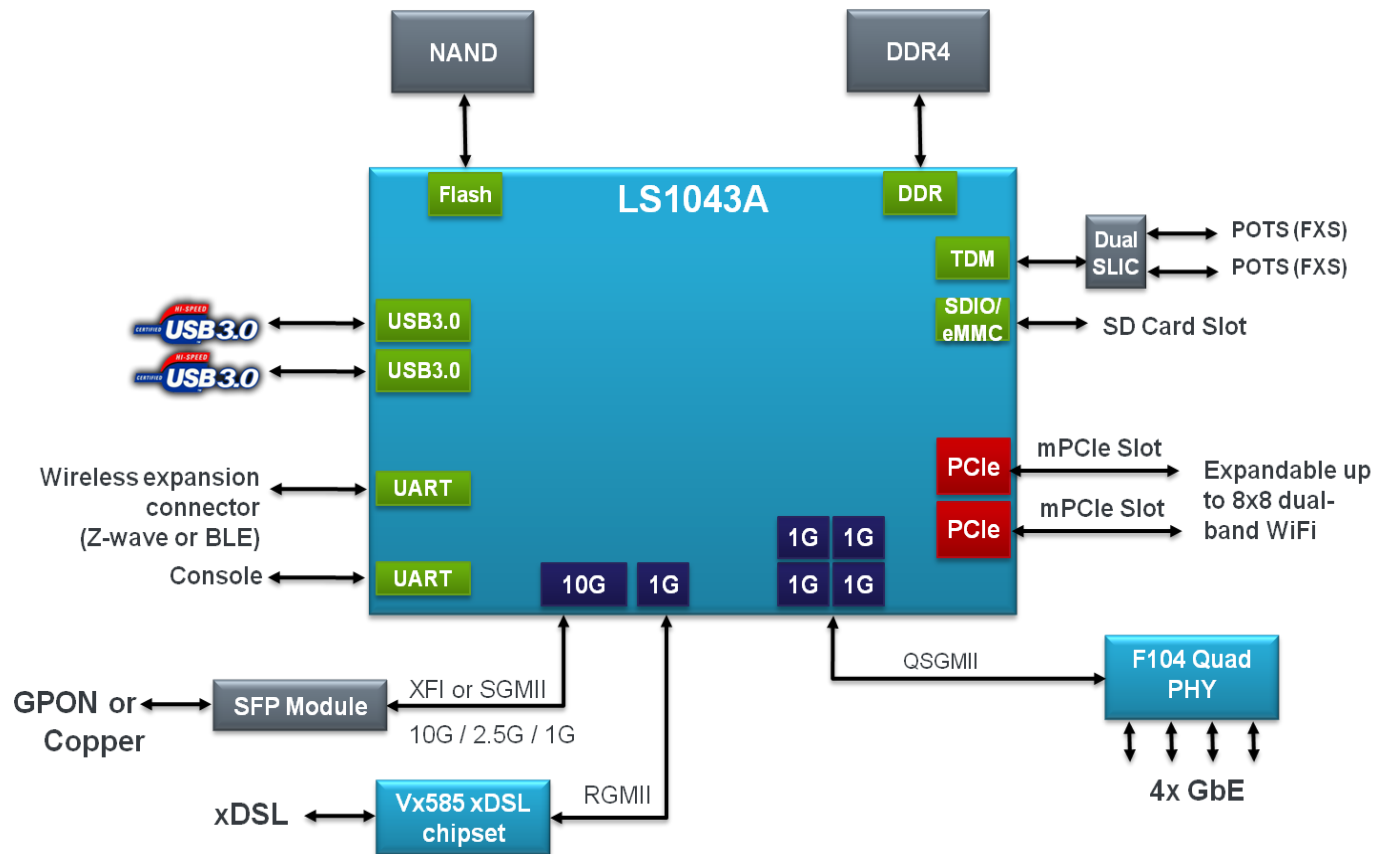
# LS1043A RESIDENTIAL GATEWAY (RGW)

# Development Point of View

- QorIQ
  - P-Series designs
  - T-Series
  - LS-Series
- Others too old to mention
- Competitor platforms



# Residential Gateway



# RGW Subsystems

- CPU
- DRAM Memory
  - 4 x8 DDR4 512Mb
  - 1600MT/sec
  - ECC
- NAND Flash
  - 2 Gb device
- Communication Ports
- I2C
  - Temperature Sensor
  - RTC

# Interface Functionality

## Supported

- 10Gbps Ethernet
- Quad Gbps Ethernet
- Dual mPCIe
- USB3.0

## Not currently supported

- DSL
- TDM

# Communication Ports

- USB Serial UART Console
- Serial UART Arduino Wireless Module
- Quad SGMII 1Gb Ethernet
- Micro SD Card Socket
- SerDes
- Mini PCIe – 2
- USB3.0 – 2

# SerDes Interface

Protocol SRDS_PRTCL_S1	Lane A	Lane B	Lane C	Lane D	PLL mapping
1460	XFI (m9)	QSGMII (m.1,2,5,6)	PCIe#3 x2		1222
2460	SGMII 2.5G (m9)	QSGMII (m.1,2,5,6)	PCIe#3 x2		1222
3460	SGMII 1G (m9)	QSGMII (m.1,2,5,6)	PCIe#3 x2		1222
1455	XFI (m9)	QSGMII (m.1,2,5,6)	PCIe#2 x1	PCIe#3 x1	1222
2455	SGMII 2.5G (m9)	QSGMII (m.1,2,5,6)	PCIe#2 x1	PCIe#3 x1	1222
3455	SGMII 1G (m9)	QSGMII (m.1,2,5,6)	PCIe#2 x1	PCIe#3 x1	1222

# Things to consider

- Power Design
- Thermal Design
- Layout
- Clocking

# SCHEMATIC DISCUSSION

# SOFTWARE CONSIDERATIONS



# Software Components

- U-Boot
- Linux BSP
- Linux File System
- Linux OS Kernel

# LS1043A Software Solutions

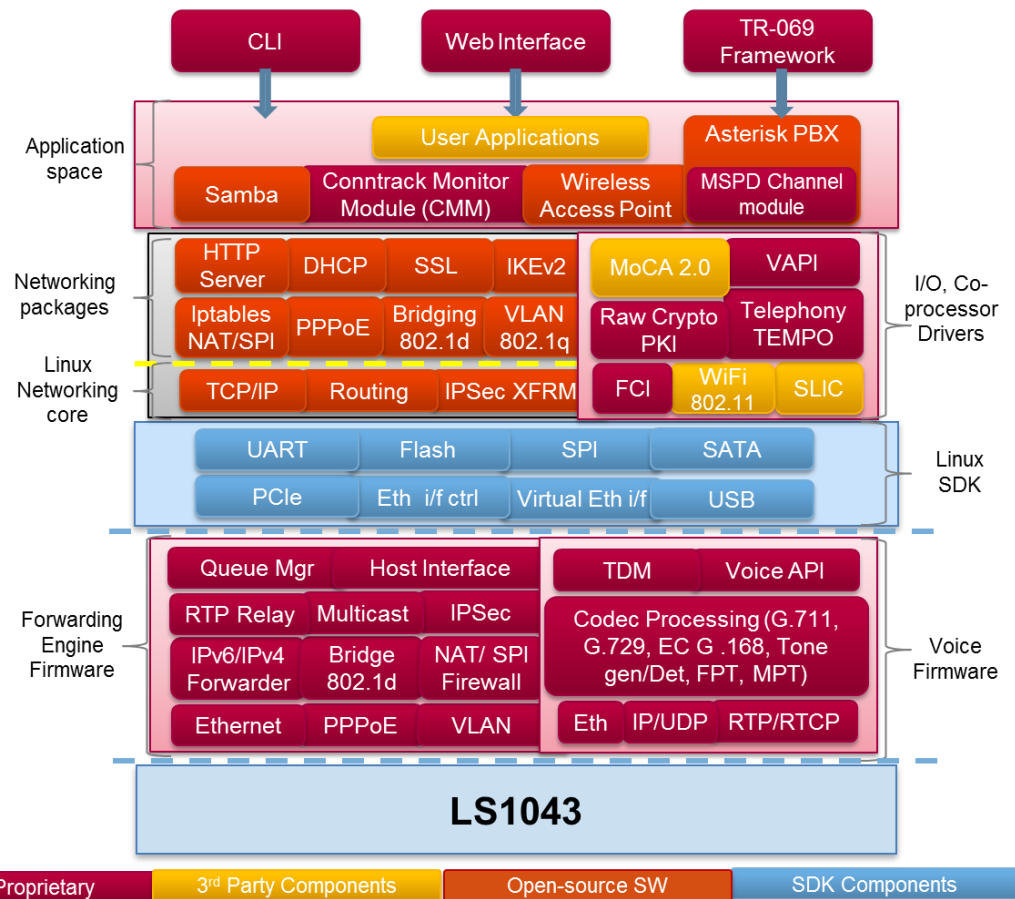
- Residential Gateway ASK
  - RGW Hardware Support
  - Full Support for Hardware Accelerators
  - OpenWRT
- Reference Design Board SDK
  - RDB Hardware Support
  - OpenWRT

# Build Environments

- CodeWarrior Tool Chain
- SDK
- OpenWRT
- ASK

# A Gateway in an ISO image

- Turn key & mature software stack – Over 10M deployed
- Highly optimized & feature rich Network stack – Fully leverages the HW Accelerators
- Wire speed performance with less than 1% CPU load
- Full suite of network application packages for variety of market needs
- Low power envelope. Ideal for PoE or PoE+ designs
- High performance SEC engine – Gigabit Encryption
- HW security – Secure boot, Trusted environment



# WI-FI

# Supported Wi-Fi Modules

Vendor	Module name / part number	Module type	Wi-Fi Format	Antenna Configuration
Quantenna	QSR10G	Dual mini-PCle (custom size)	802.11ac Wave3	8x8
Quantenna	QSR1000	Mini-PCle (custom size)	802.11ac Wave2	4x4
Qualcomm	Cascade	Mini-PCle	802.11ac Wave2	4x4
Qualcomm	Beeliner	Mini-PCle	802.11ac Wave2	4x4
Celero	CL2400	Mini-PCle	802.11ac Wave2	4x4

# ENCLOSURE

# 8x8 Solution





# LESSONS LEARNED

# Summary

- Hard Coded Reset Configuration Word (RCW)
  - Expects 100 or 125MHz Clock on both SerDes controllers
  - Not available with 10GE clocks of 156MHz
  - Requires SD card boot for initial RCW load
- Boot SD card detect must be on SDHC\_CD\_B
- Reset and JTAG connections
  - Reset on JTAG connector is not TRST
  - Follow TRST connection recommendations
  - Gated reset signals

# Thank You

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