Jim Bruister

SoC Solutions

About Us…

- System on Chip (SOC) Silicon IP and Integration Company
- Based in Georgia, USA – Incorporated in 2000
- Specializing in AMBA® based AXI and AHB Subsystems
  - Targeting the IoT, M2M and low power/performance device markets
- Thorough knowledge of ARM Cortex-M0, M3, A5, Dual A9 as well as similar processors from other CPU vendors.
- Developed ARM based SOCs for over 25 years
  - 1st ARM design was with VLSI Technology in 1988

“What’s your Bright Idea?”

“Intelligence of Things”

Intelligent
(processor)

Fit
(Power Management)

Connected
(Bus System)

Good Communicator
(Wireless or Wired)

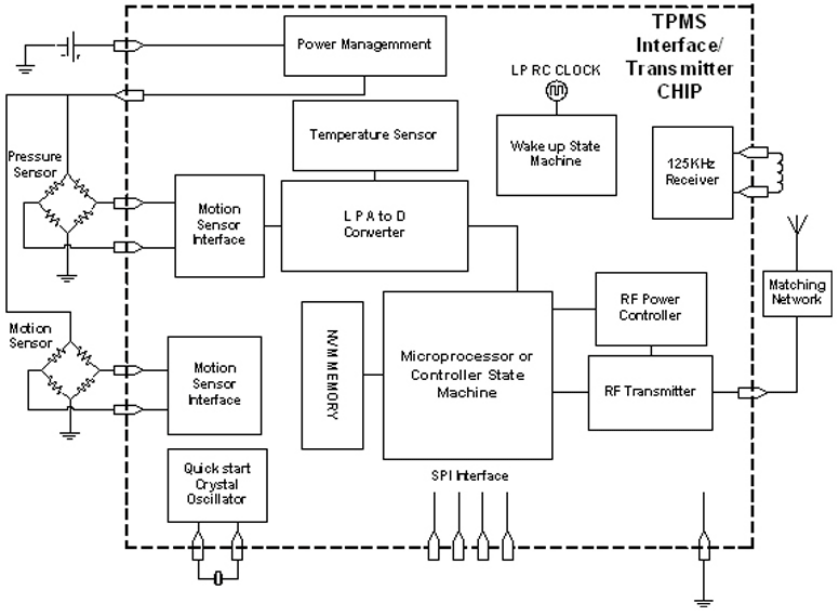
Good Memory
(NVM, RAM)

Protected
(Security / Encryption)

Three IoT Architectures

1. Simple Low Power Sensor System
2. Low Power System with Analysis Capability
3. Complex / Low Power System with Multiple Tasks

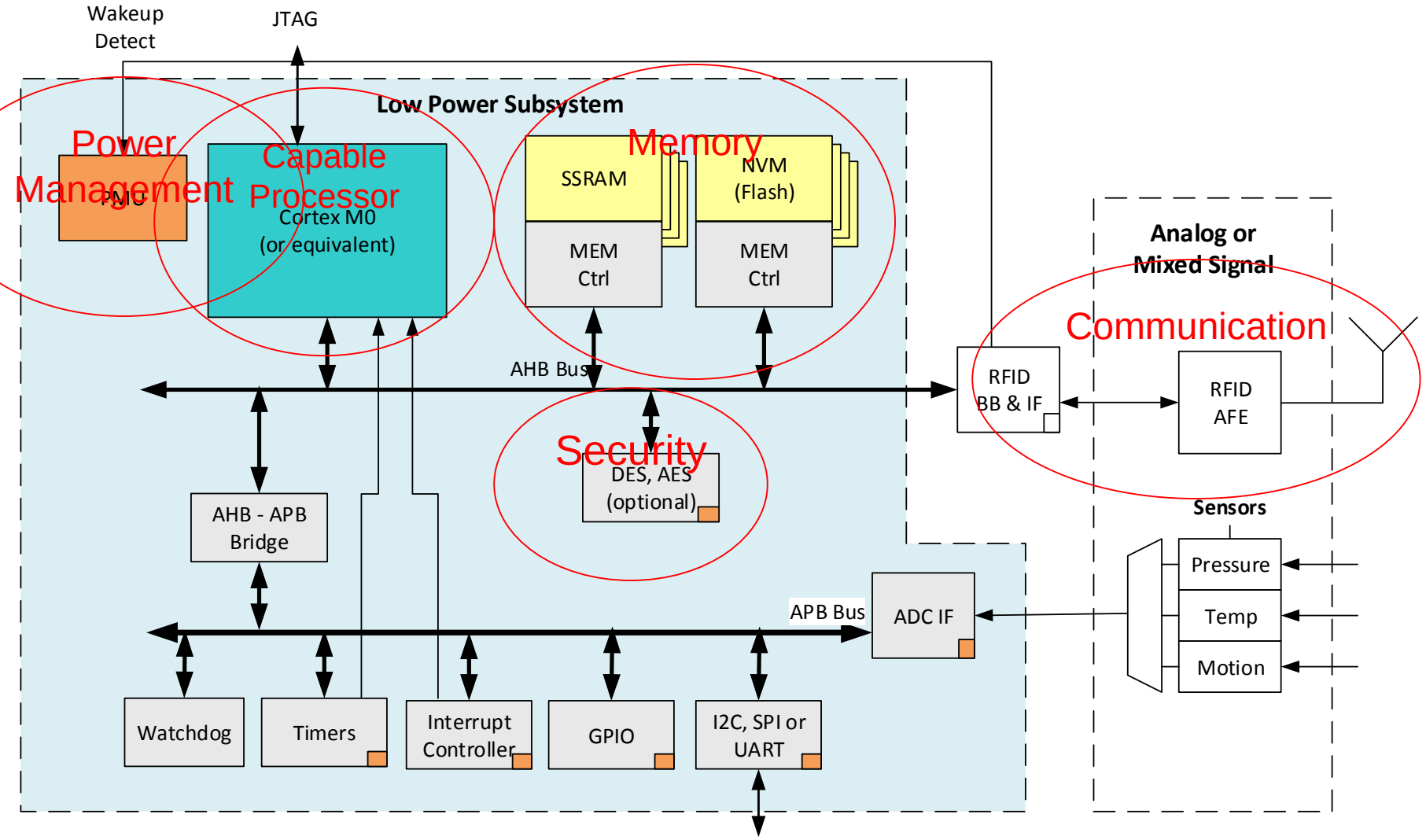
Tire Pressure Monitoring System



TPMS Features

- Sensors
  - Pressure
  - Temperature
  - Motion
- RFID Transceiver
- Very Low power
  - Wake up send data and shut down
- Memory
  - Some data logging
- Implemented as SOC or SIP

Low Power Subsystem for TPMS



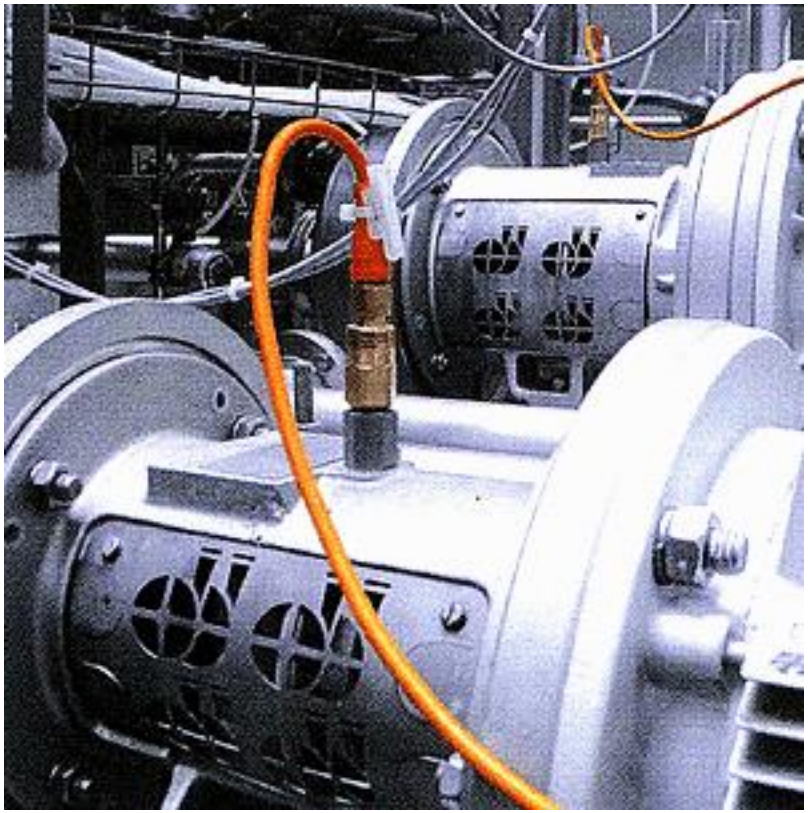
TPMS Subsystem Features

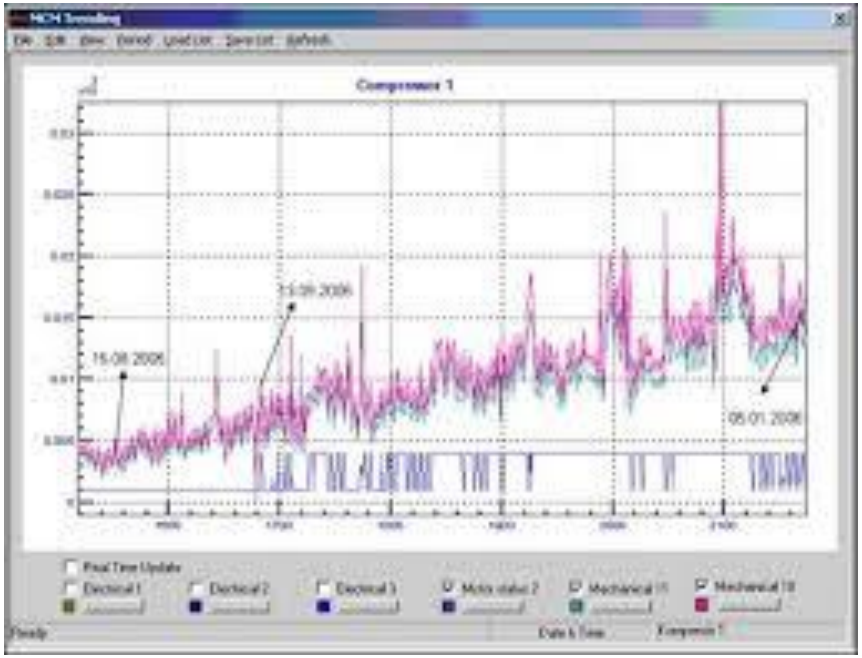
- 32bit Processor
  - Cortex M0, Coldfire or similar
  - No Cache or MMU
- Simple AMBA® 3.0 AHB-Lite / APB Bus
  - Large number of available AMBA peripherals
- Little or no external Memory.
  - No DDR, SRAM or Flash
  - Exception, SPI flash for boot.
- Custom Power Management
  - Very low pinout
  - Wake up / Sleep logic.
  - Basically shut the whole chip down until a measurement is needed.
  - Custom FSM to sequence any Mixed signal or RF AFE circuitry.

TPMS Subsystem Features

- Software
  - Small Kernel
  - No RTOS
- Security
  - Encryption in Software
    - (or optional HW block)
  - No need for TCP/IP monitoring
    - Done at the Gateway
- Interfaces on the AHB or APB bus
  - Internal Mixed Signal (SOC) or off-chip Sensors (SIP)
  - AFE on-chip (SOC) of off-chip (SIP)
  - A/D Converters

Industrial Health Monitoring System

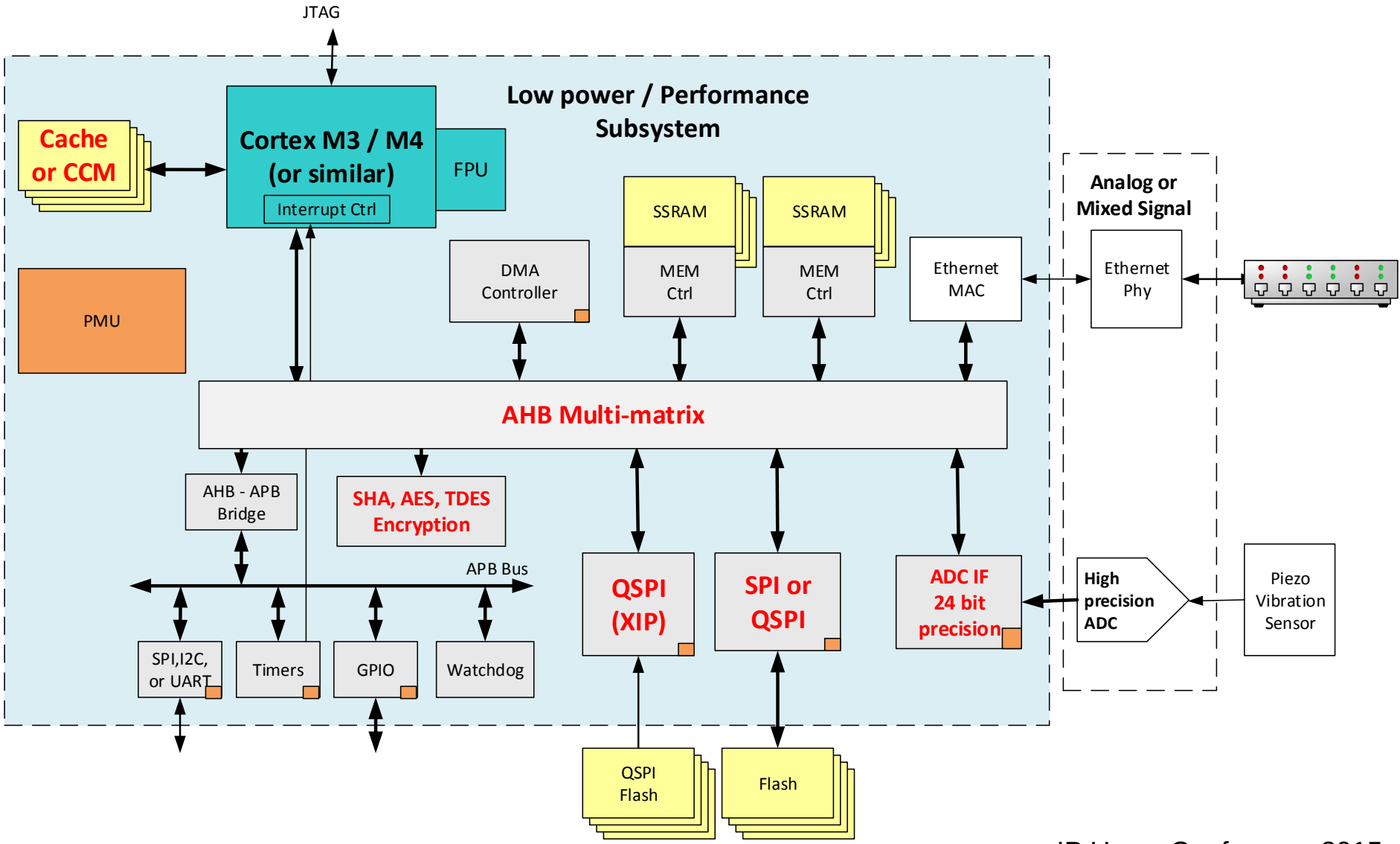




IHMS Features

- Highly accurate vibration sensor
  - Typically 24 bits.
- Spectral Analysis
  - Motor health
- Data logging
  - Store historical analysis results
- RF Transmitter (wireless) or Ethernet (wired)
- Software & Communications
  - TCP/IP
  - Command protocol for responding to host

Low Power / Performance
Subsystem for IHMS



Software

- Small RTOS or Multi-threaded scheduler
  - Embedded Linux
  - Nucleus, µCOS, ThreadX, etc.
- FFT or Spectral Analysis
  - Floating point calculations
- Results
  - Logged in Flash
  - Flash File System ?
- Communications
  - TCP/IP

IHMS Subsystem Features

- 32bit Processor
  - Cortex M3/M4, or similar
  - Floating Point Unit (FPU)
  - Cache
- AMBA® 2.0 AHB Multi-matrix Bus Fabric
  - Multiple Masters
  - Large number of available AMBA peripherals
- DMA
  - Move data from sensors to memory
- QSPI with Execute in Place (XIP)
  - Saves expensive internal SRAM

TPSM Subsystem Features

- Internal Memory
  - Cache to assist QSPI XIP
  - Data Buffers for Calculations
- External Memory for storing results
  - Flash
- Power Management
  - Power islands for turning off peripherals and interfaces while not in use.
  - Custom FSM to sequence any Mixed signal or RF AFE circuitry.
- Security
  - AES, SHA3, RSA or custom encryption
  - In **hardware**

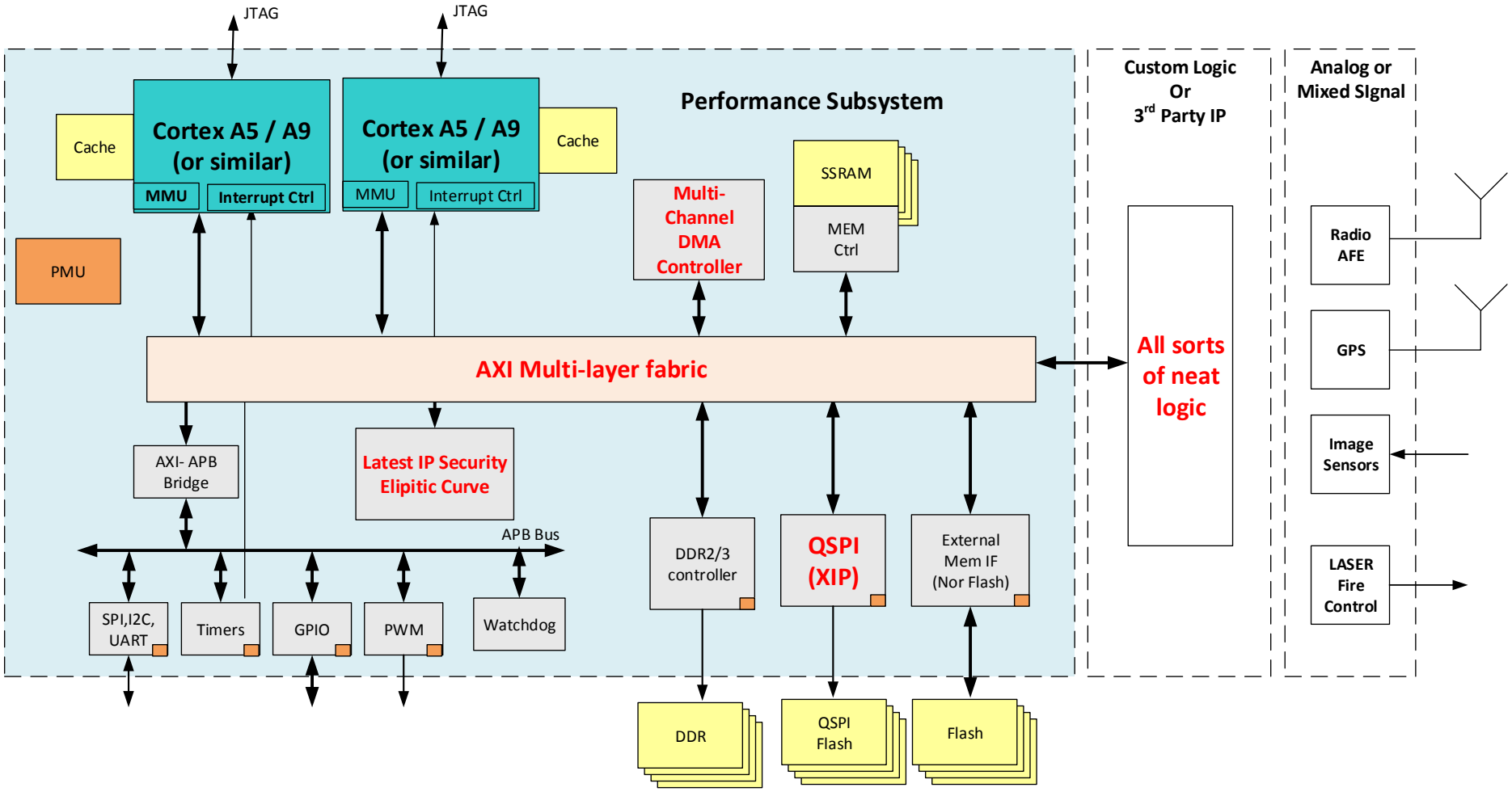

IDEA

Dr. Evil's Laser Sharks

DELS Features
(Dr. Evils Laser Sharks)

- GPS Navigation
- Image Recognition System
- Laser Weapon Deployment System
- Energy Harvesting - Power Management System
- Wireless (or sonar) Communication
- Shark Health Monitoring System
- Austin Powers Health Monitor (or not)

Custom Performance Subsystem



DELS Subsystem Features

- Multiple 32 or 64bit Processors
- AMBA® AXI Multi-layer Bus Fabric
- Multi-channel DMA
- QSPI with Execute in Place (XIP)
- Internal Memory
  - Multiple Buffers, Heap Memory, Cache(s)
- External Memory
  - Nor Flash, DDR3, SDIO ?
- Power Management
  - Custom FSM for sequencing Analog and Digital Power
- Security
  - Elliptic Curve or most advanced encryption

SoC Solutions™

Thank you