

# A MicroTCA LTE Enterprise Femto Base Station Demonstrator

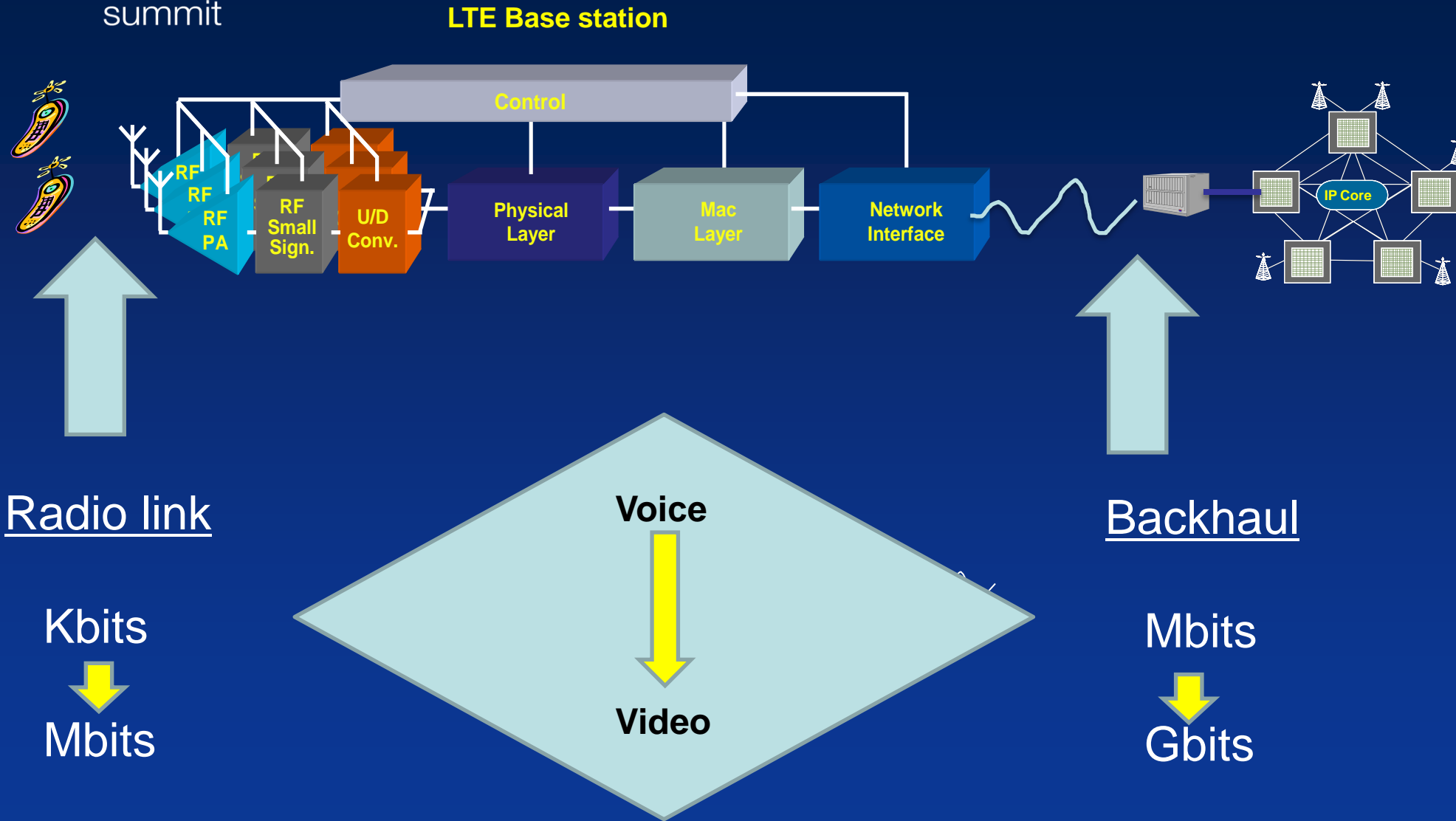
Tim Summers  
European Networking Products Division  
Manager  
Freescale



## Agenda

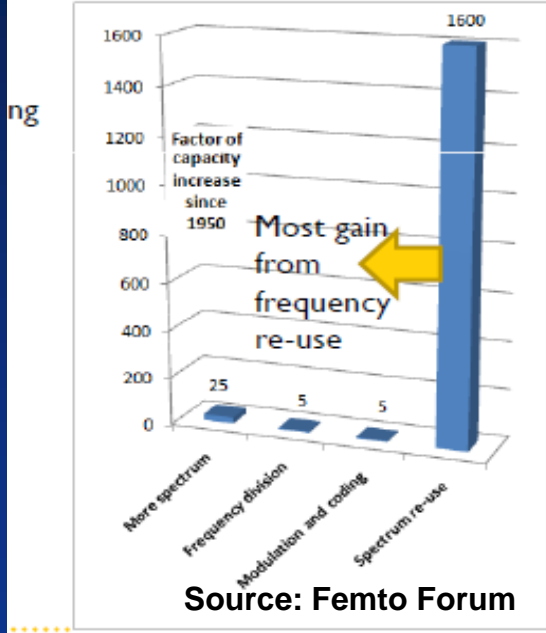
- Some background and explaining the challenge
- Development objective
- Conclusions

# Network Bandwidth Squeeze Points



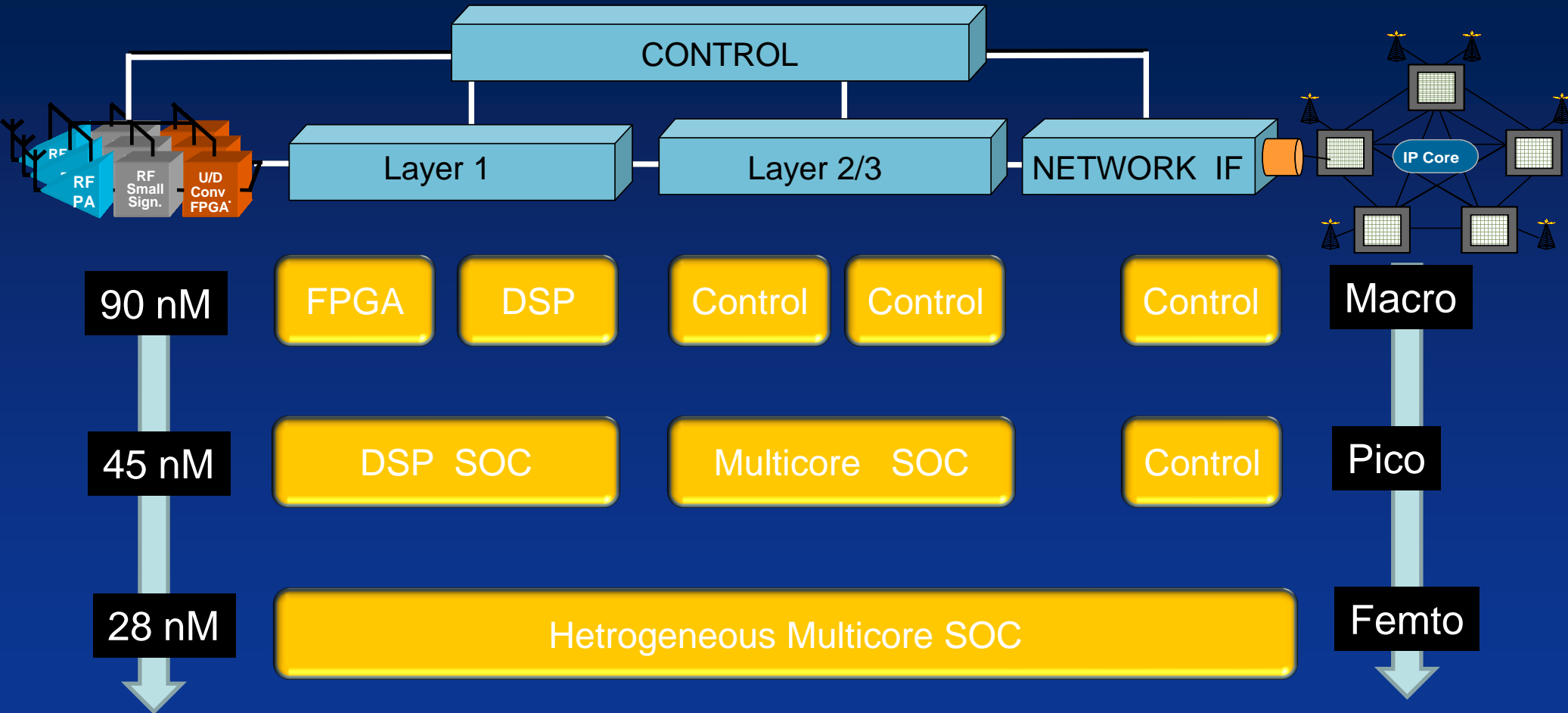
# Scalable Base Stations: The Case for Small Cells

Cooper's Law suggests that increasing the number of cells has always been the main means of adding capacity

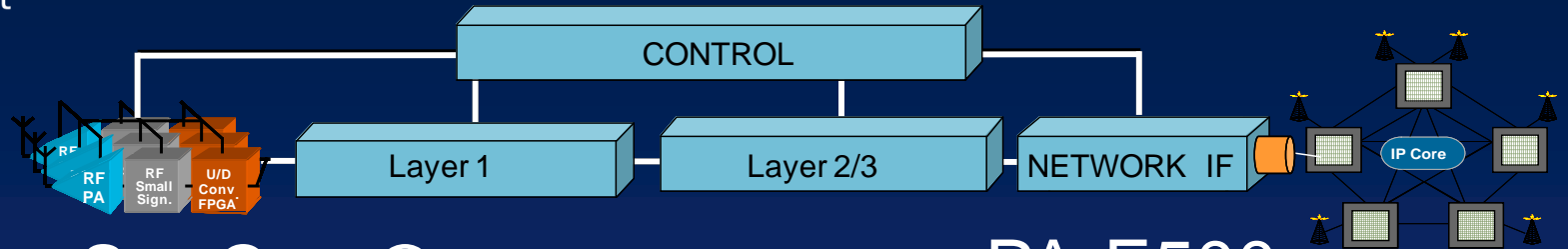


Frequency reuse is the best way of adding high bandwidth capacity

# A Typical Base Station Integration Scenario

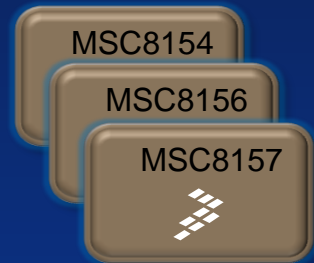


# Freescalable Scalable Base Station Elements

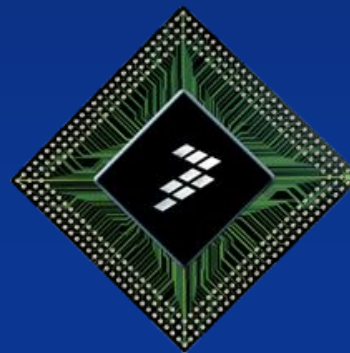


**StarCore<sup>®</sup>**

**PA-E500**



**Macro/Micro**



Scalable IP Architecture

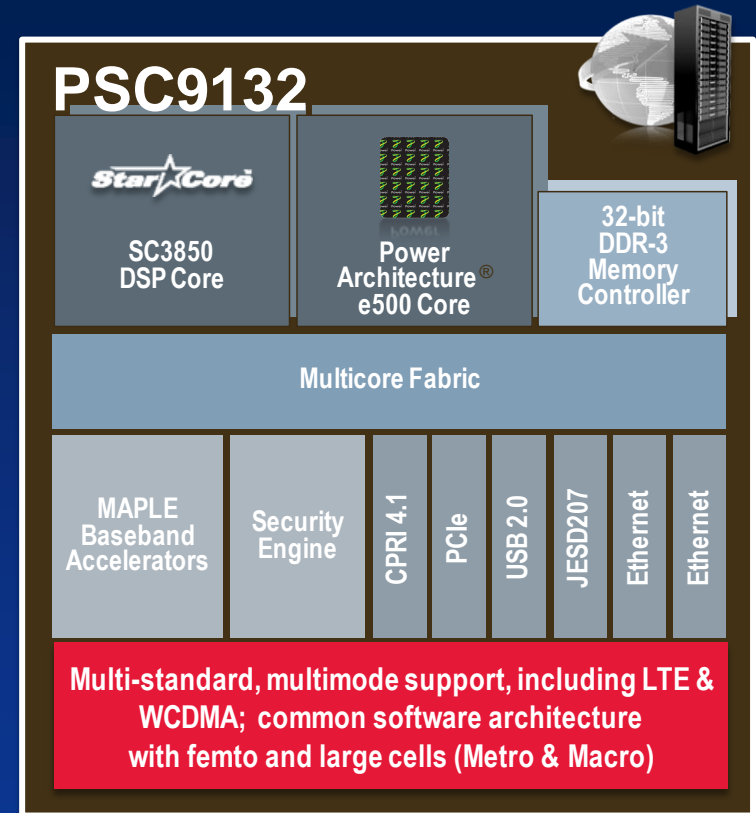
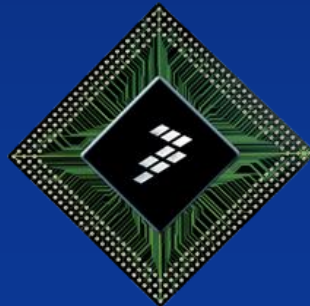
Common SW Architecture

**Pico/Femto**

# Picocells/Enterprise-Femtocells Solutions

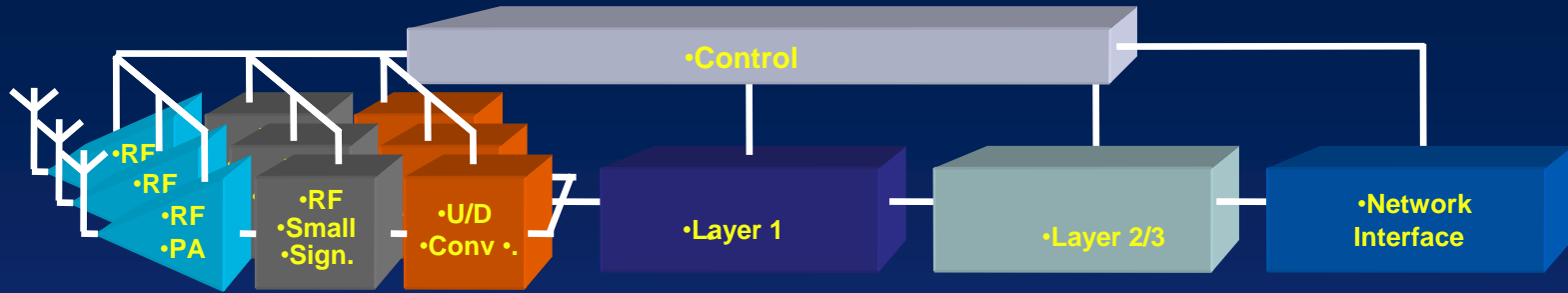
## QorIQ Qonverge

- Heterogeneous multicore with acceleration
- Trusted –Secure boot
- SOC based
- Common software architecture
- Power optimised



*Nimble base station technology*

## MicroTCA / AMC Enabled Software Development System Objectives



### RF

- 700 MHz Band 13
- 10 dBm output PWR
- Modular design
- Fit on AMC card

### Baseband

- Software architecture similar to final SOC
- Re use existing AMC IP
- Initial support for LTE 10 MHz FDD channel
- AMC form factor

# P2020 + MSC8156 Advanced Mezzanine Card

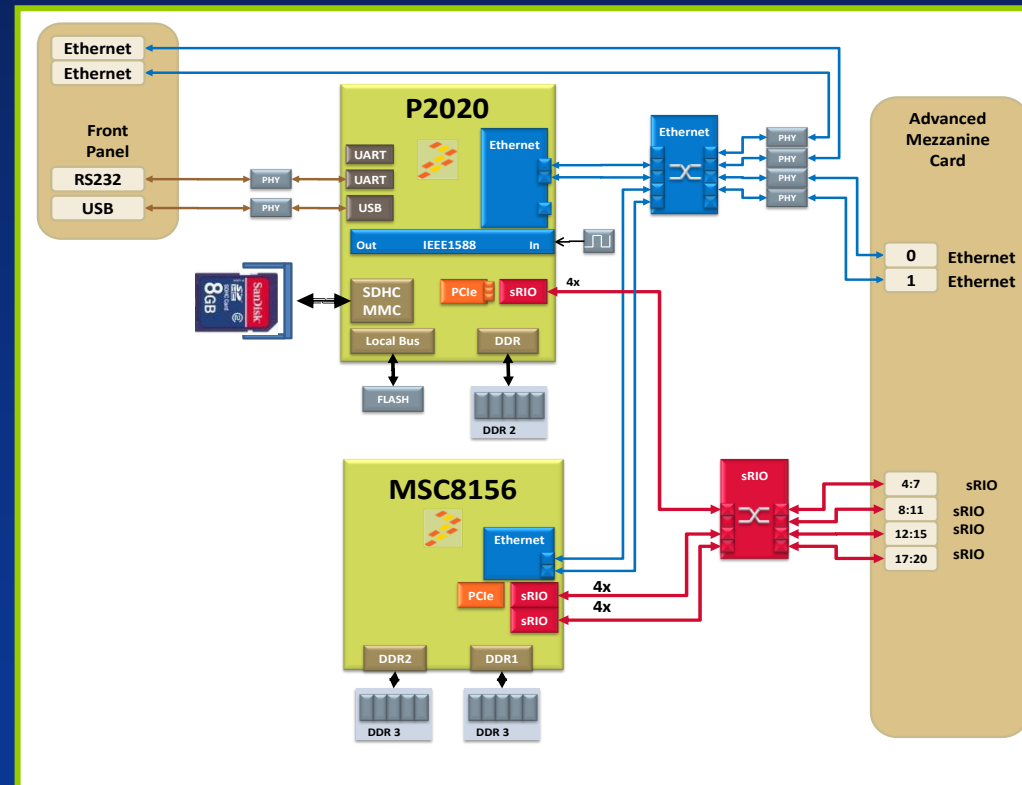


## P2020 QorIQ<sup>®</sup> Processor

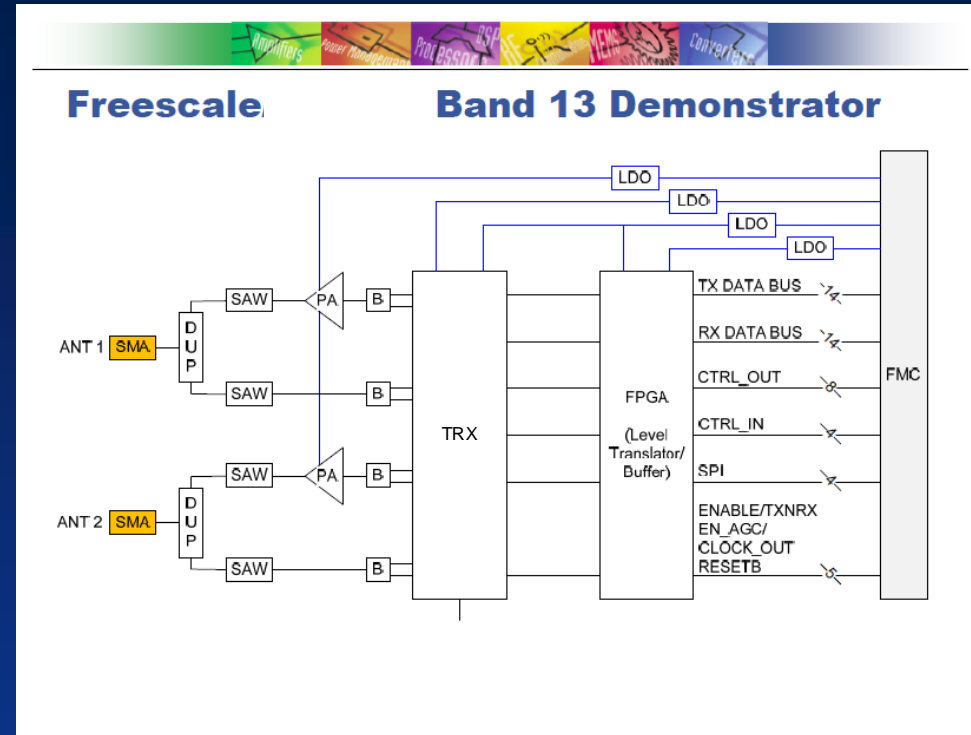
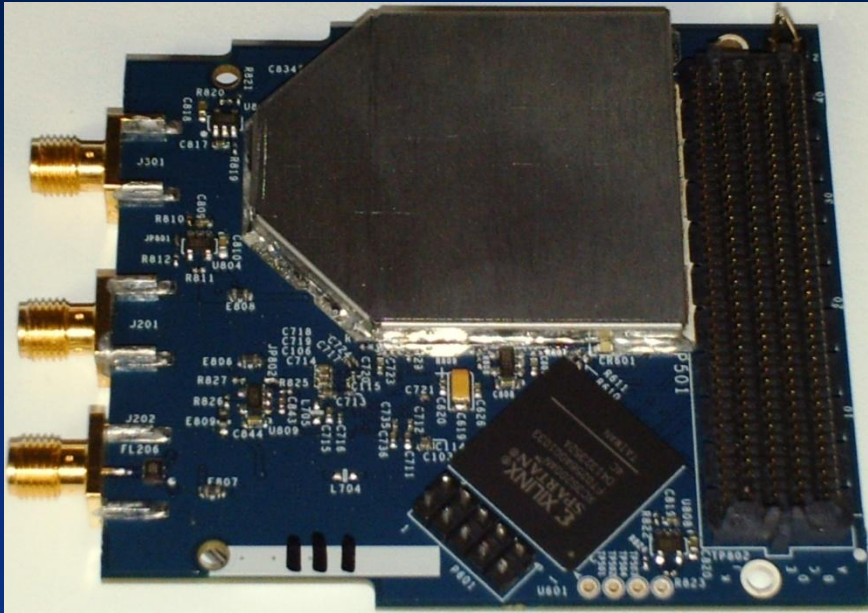
- Dual e500v2 Core at 1.2 GHz
- 1 GByte of DDR2 (SOCDIMM)
- TCP/IP acceleration
- eSDHC
- USB

## MSC8156 DSP

- Six SC3850 StarCore cores at 1 GHz each
- Multi Accelerator Platform Engine for Baseband (MAPLE-B)
- Programmable Turbo and Viterbi decoder
- Two banks of 512 MByte 64-bit DDR3-800

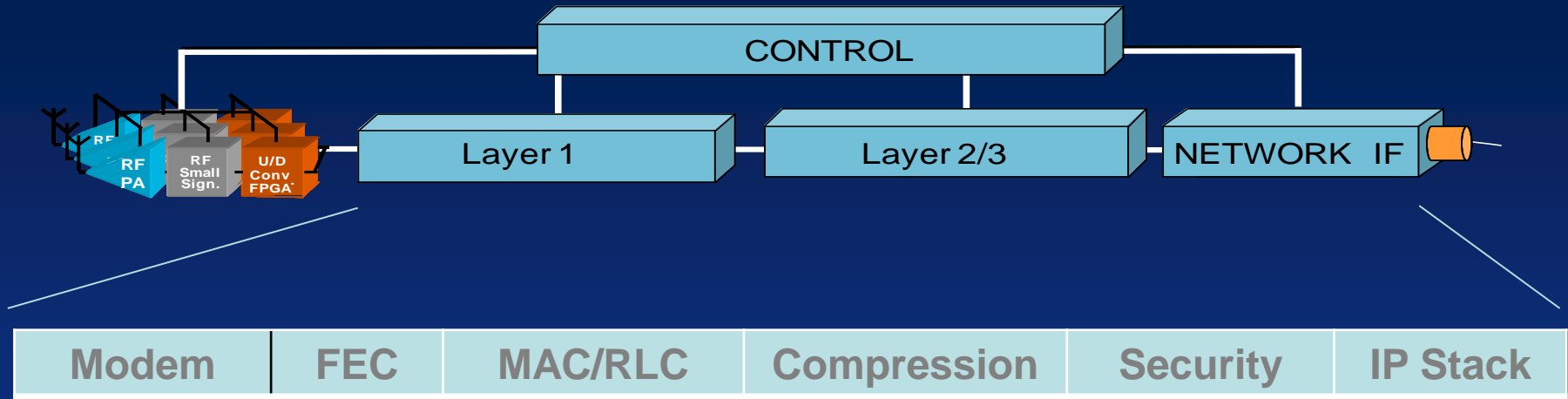


# FMC Form Factor Radio Module



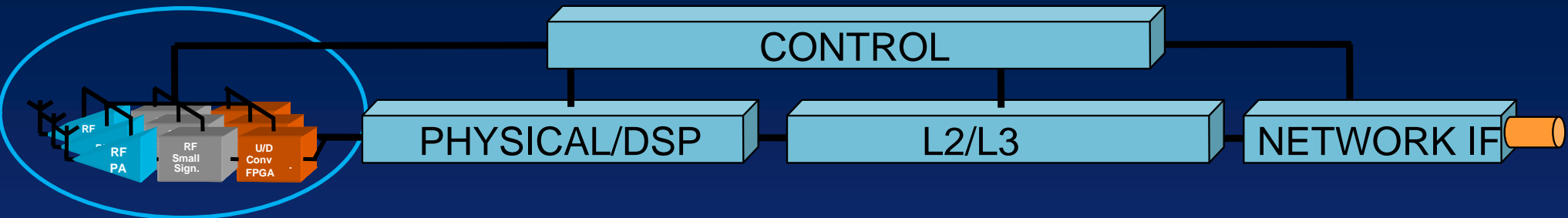
- 700 MHz : 10 dBm : Band 13
- Mimo capable
- GPS input for synchronisation

# Software Considerations



- LTE- FDD 10 MHz Layer 1, 2, 3
- 2x2 uplink MIMO capable
- 50 Mbs down link and 25 Mbs uplink

# MicroTCA Based Femto Systems Development Platform



FPGA AMC Card Serial to Parallel



P2020 + MSC8156 Advanced Mezzanine Card



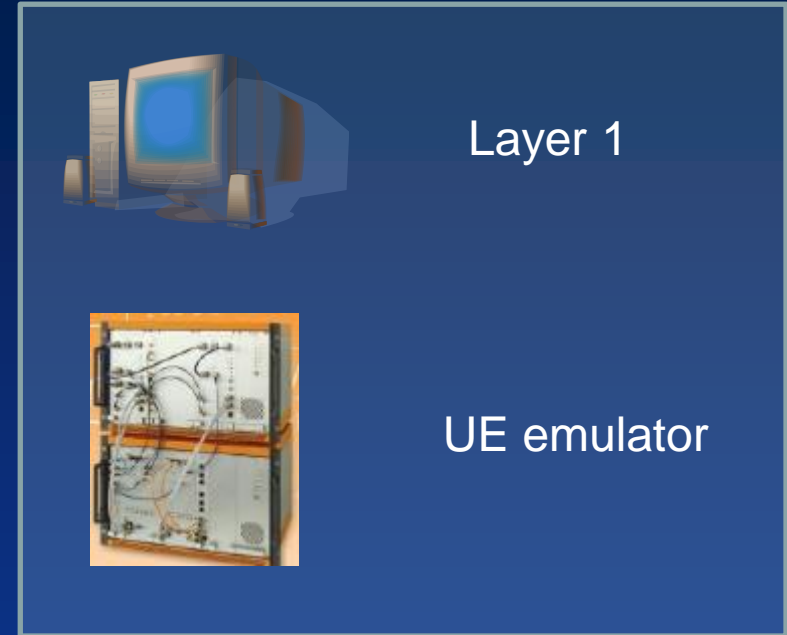
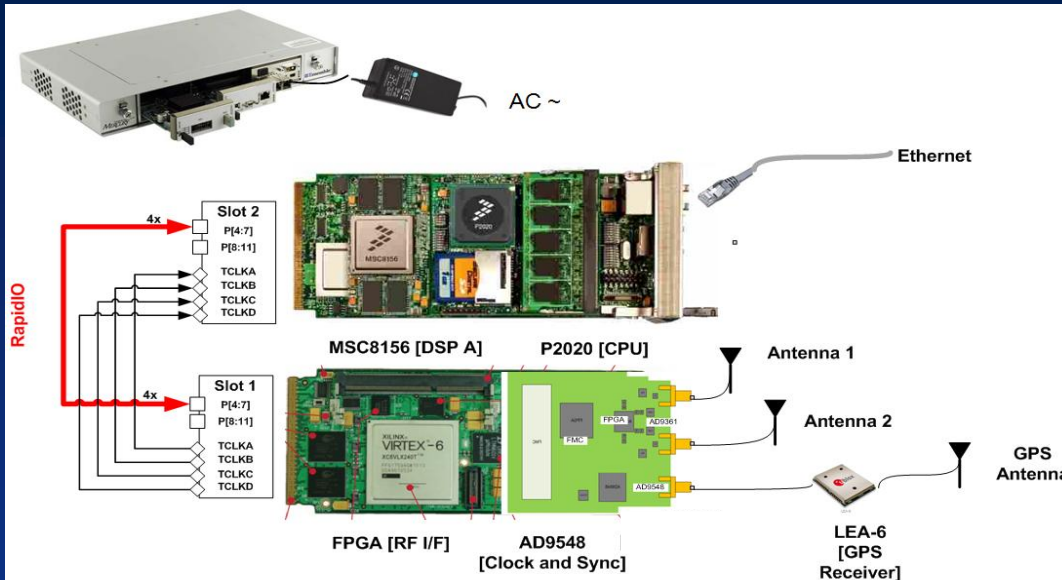
SRIO

RF 700 Mh LTE capable PA/TRX FMC



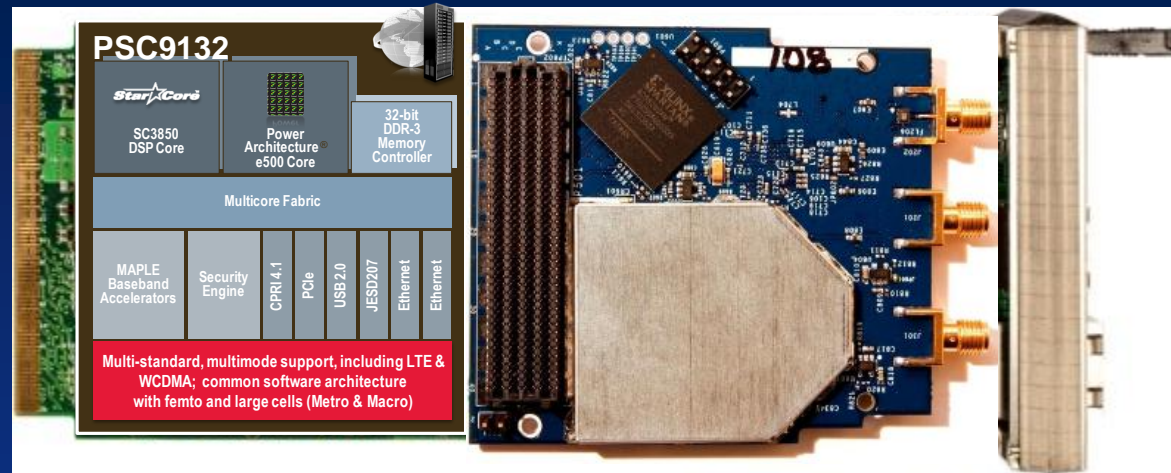
# MicroTCA Based Femto Systems Development Platform

Test Environment



- Layer 1 code verified against MATLAB reference model
- Commercial UE emulator used for system verification

## Highly Integrated Packets to Modulations AMC card?



- Multi standard baseband with a configurable RF subsystem
- Schematics and Gerber's available for the RF board

## MicroTCA Demonstrator: Some Concluding Remarks



- An elegant solution which met our development system objectives
- Potentially deployable as a product with some further effort
- Scalable via Freescale's QorIQ and DSP product range