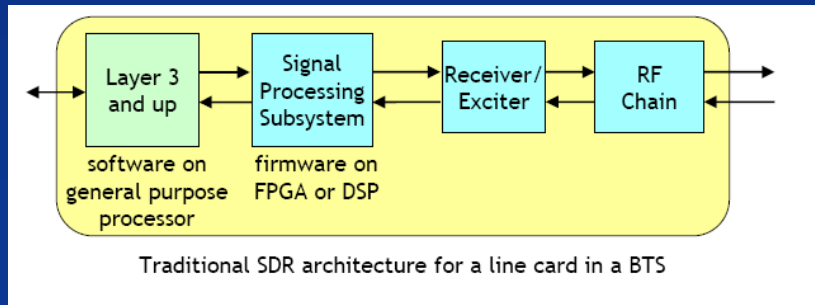
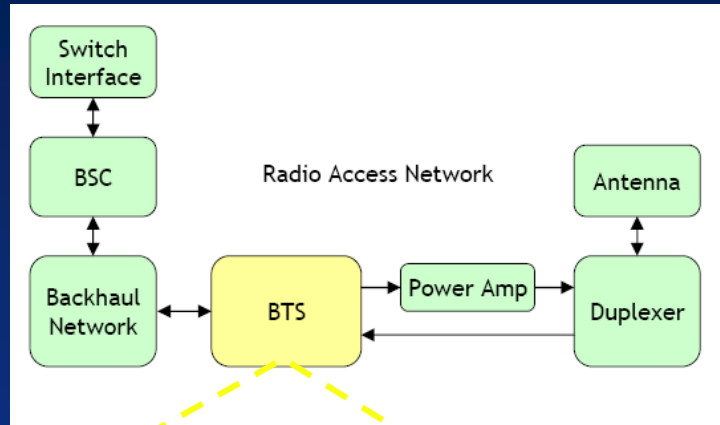


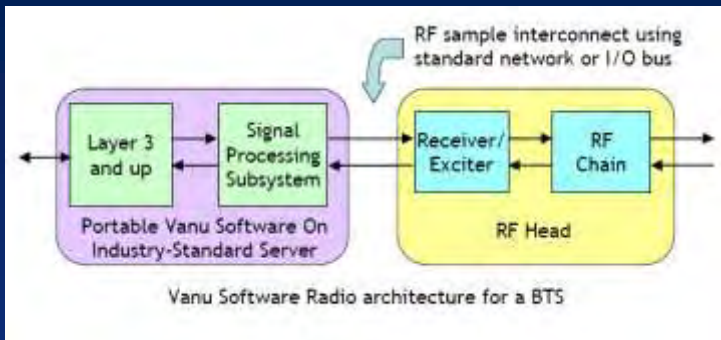
Software Defined Radio on open MicroTCA equipment

A case study

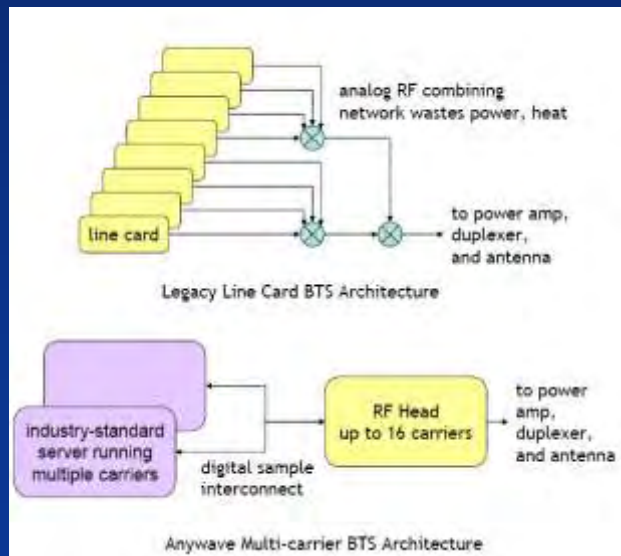
The application.... a BTS



What is different about this BTS ?



- Digital interconnect to the RF head
- Signal processing subsystem runs on iA hardware
- BTS can run
 - multiple carriers
 - on multiple standards (CDMA, GSM, ...)
 - for run multiple operators
- Reduced OPEX, reduced CAPEX, improved flexibility
 - Especially in rural areas



High level project requirements

Cost

- Cost efficiency is the basis for any solid product
 - COGS + NRE

OPEX

(Power consumption)

- Electricity is not for free...

Time to market

- No time to re-event the wheel

Modularity & scalability

- Simplify adding hardware for
 - More carriers
 - More standards (CDMA, GSM, ...)
 - Multiple operators

RASUM

- Carrier grade environment
 - Opt. redundancy / 5 9's
 - Hot swap, ...
 - Managed platform

Technical project requirements

Physical Size

- Rack space is precious
 - Integration with radio heads and PAs in one Rack
 - Stacking option without losing space

Computing power

- Need lots of iA computing power

Equipment practice

- Cooling
 - Support front to rear (std / NEBS)
 - Support bottom to top (outdoor)

Digital interconnect

- Gigabit Ethernet (GbE)
 - Connection between RF heads and processing units
 - Communication between processing units and O&AM

Backhaul interface

- GbE or T1/E1

Platforms of choice

▪ Rack mount servers

- Off the shelf hardware 😊😊
- Processing power per unit 😊😊
- OPEX (Power) 😞😞
- Cost 😊😊😊
- Telco grade HW available 😊
- Physical space requirements 😞😞😞
- Life cycle 😞😞
- Cabling to external switch 😞

▪ Semi-custom PICMG1.3 solution

- Off the shelf board hardware 😊
- Open Standard 😊
- Longevity 😊
- Scalability 😊
- Reliability 😞😞
- Cost 😊😊
- Physical space requirements 😊
- Lower processing power per unit 😞
- Custom chassis design 😞
- Switch integration/cabling 😞

▪ MicroTCA

- Off the shelf hardware 😊
- Open Standard 😊
- Longevity 😊😊
- Scalability 😊😊
- Carrier Grade Platform 😊😊😊
- Cost 😞😞😞
- OPEX (Power) 😊
- Physical space requirements 😊😊
- Lower processing power per unit 😞
- Switch integration 😊😊

*How to resolve the negative items
(cost, CPU power) for uTCA while not
sacrificing its strengths ?*

How did we do it ?

- 3U MicroTCA chassis
 - Bottom to top cooling
 - Airducts for front to rear cooling
 - Airducts add 1U, lossless stacking
 - 40W/slot cooling

- 600W Redundant DC Power Supplies
 - 2 power units
 - 4 power modules

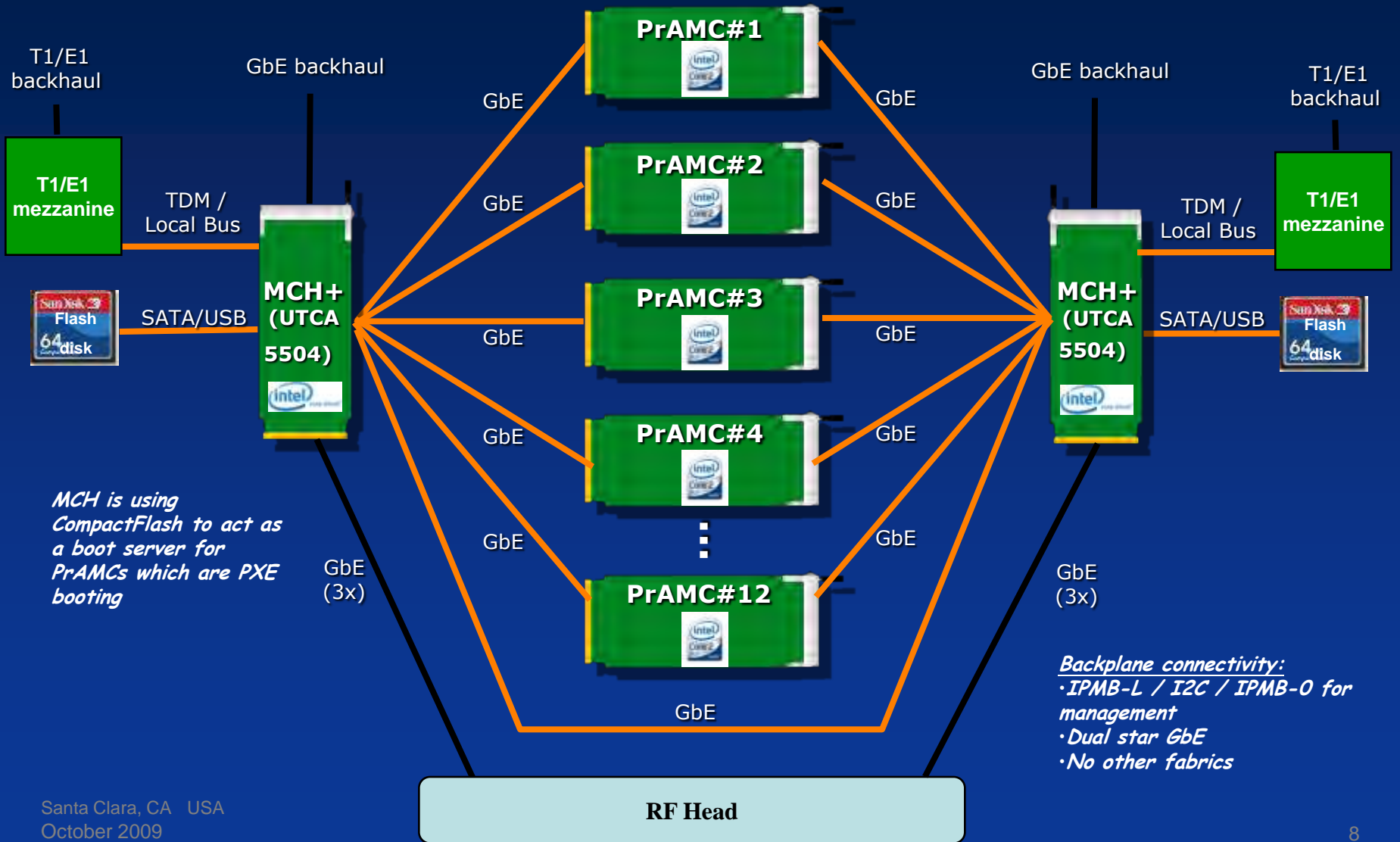
- dual-dual star GbE Backplane

- 12 full size AMC slots
 - Used for up to 12 PrAMCs
 - Intel low voltage 45nm Core2Duo CPUs (Penryn)
 - Optimum tradeoff between processing power and TDP

- 2 advanced MCHs
 - System management + GbE switching
 - 4 1000BT front ports
 - Integrated Intel x86 SoC
 - O&AM
 - Backhaul
 - Optional T1/E1 backhaul mezzanine



Vanu SDR BTS System architecture



MicroTCA ...the platform of choice

- MicroTCA is a perfect feature match for mission critical applications
 - High density
 - Flexibility & scalability
 - RASUM
 - Performance

- Full COTS solutions do not meet the cost / feature sweet spots sometimes
 - Optimizations at system architecture level required
 - COGS / OPEX / Time To Market / Features optimization
 - MCH technology is the key
 - Without owning the MCH, some cost/feature optimizations would not have been feasible

- What about NRE and time to market ?
 - Re-use of IP is key
 - 3 months from project kick off to prototype system shipped to customer
 - SW R&D ongoing in parallel

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or just stop by at our booth....

