

Multi standard

- International operators
- service & maintenance costs
- logistics in production
- updates
- debug

Multinational operators

- operator wants to control the mobiles
- adapt the basestation to the mobile

To make it happen

- New cost function
today, cost/voice channel

The standards

- GSM (200kHz ch)
- PDC (25kHz ch)
- DAMPS (30kHz ch)
- AMPS (30kHz ch)
- EDGE (200kHz ch)
- WCDMA (5-20MHz ch)

Software radio

- The same standards,
better platforms,
more functionality in software
- New BB architecture

Software radio

- lots of software

Traditional design

- first design HW
- then squeeze the code

redesign

- Redesign harder than design
- HW to SW transformation
- redesign
 - no realization IP reuse
 - functional IP reuse

Functionality in software

- compiler friendly DSP
- compiler friendly code
- asm level capability
- efficient compiler (difficult to do)

Design procedure

- separate functionality and implementation
- separate application and RTOS
- separate data and control flow

BB HW

- parallel DSP
- micro controller
- accelerator
- code and data storage
- interconnects

New partitioning

- Traditional, TRX/board
- New, multi channel

Real time requirements

- Algorithmic delay (frame based)
- implementation delay
 - time to produce the frame in the AD
 - buffering
 - mips
- control
 - power control
 - channel quality

BS radio

- higher sensitivity than mobiles
- higher output power than mobiles
- no batteries but fans

The control

- messy and a lot
- much functionality in the standard
- logical channels mapped on physical channels
- parameter transfer during hand over, synch, call setup etc

The control code

- FSM and if-else structure
- suitable for graphical modeling (documentation), SDL, UML, object time etc
- not time critical but requires much code space
- formal verification?

Examples of Use Cases

- Mobile Session
 - Call Setup, Call In Progress, Call Release
 - Service Renegotiation, Handover
- Non MS Use Cases
 - Idle Measurements
 - Broadcast System Information
- Configure Cell
 - Add New Software Component

RT, multi channel

- High linearity (low efficiency)
- High power
- peak factor
- no combiner

Multi channel, RR

- High dynamic range
 - no AGC
 - adjacent channel interference
- high BW
 - several channels
- All the difficult parameters collected in the AD converter

Multi standard RR

- Digital channelization (filters)
- resampling,