

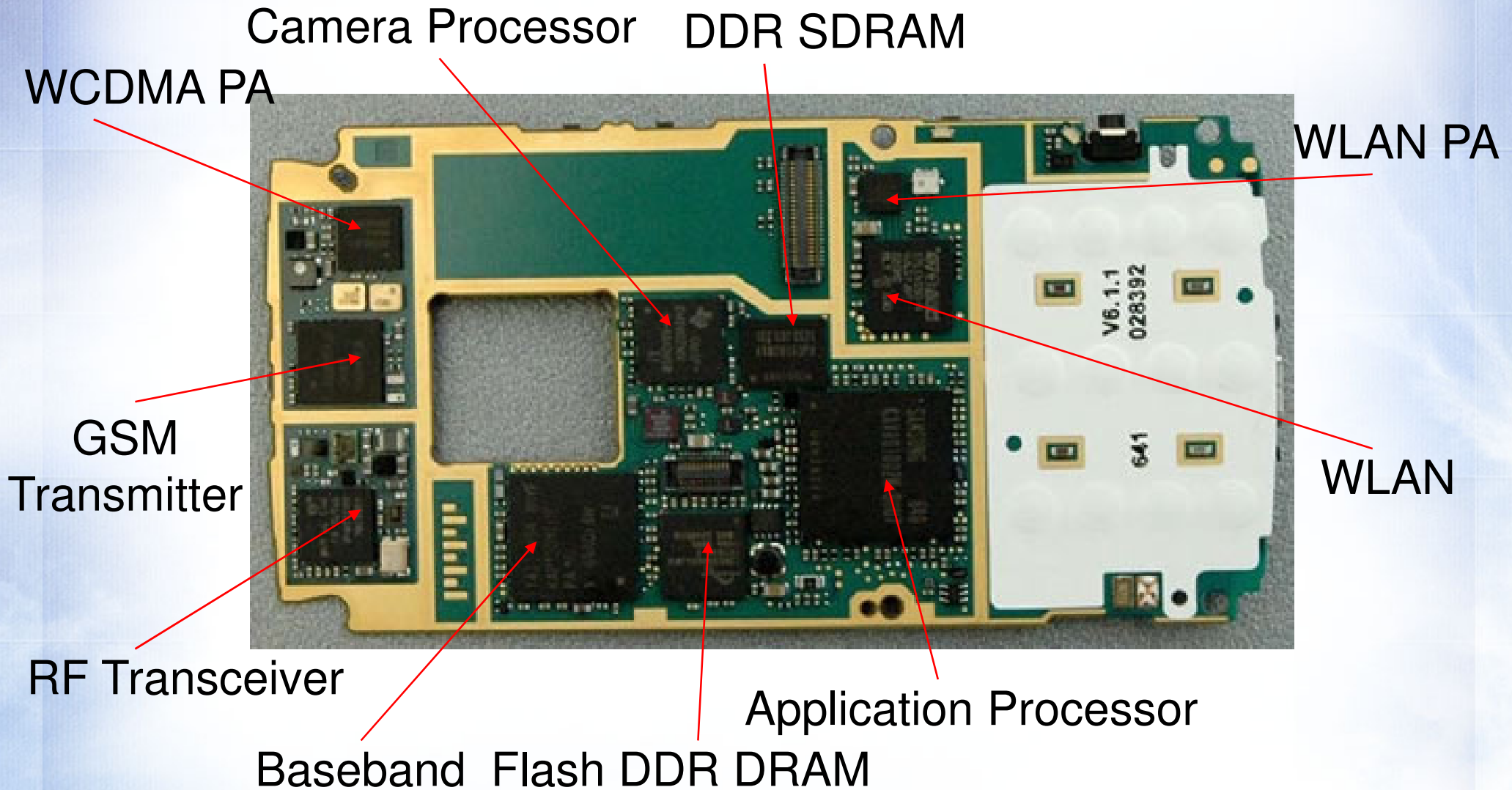
Introduction to the HW Engine

Anil Nair

Agenda

- HW architecture
- Application processor
- Baseband
- Modem
- Power Control

Inside a mobile phone



Inside a mobile phone

Audio ASIC

FM Radio Tuner

Accelerometer

Power ASIC (Nokia)

Bluetooth

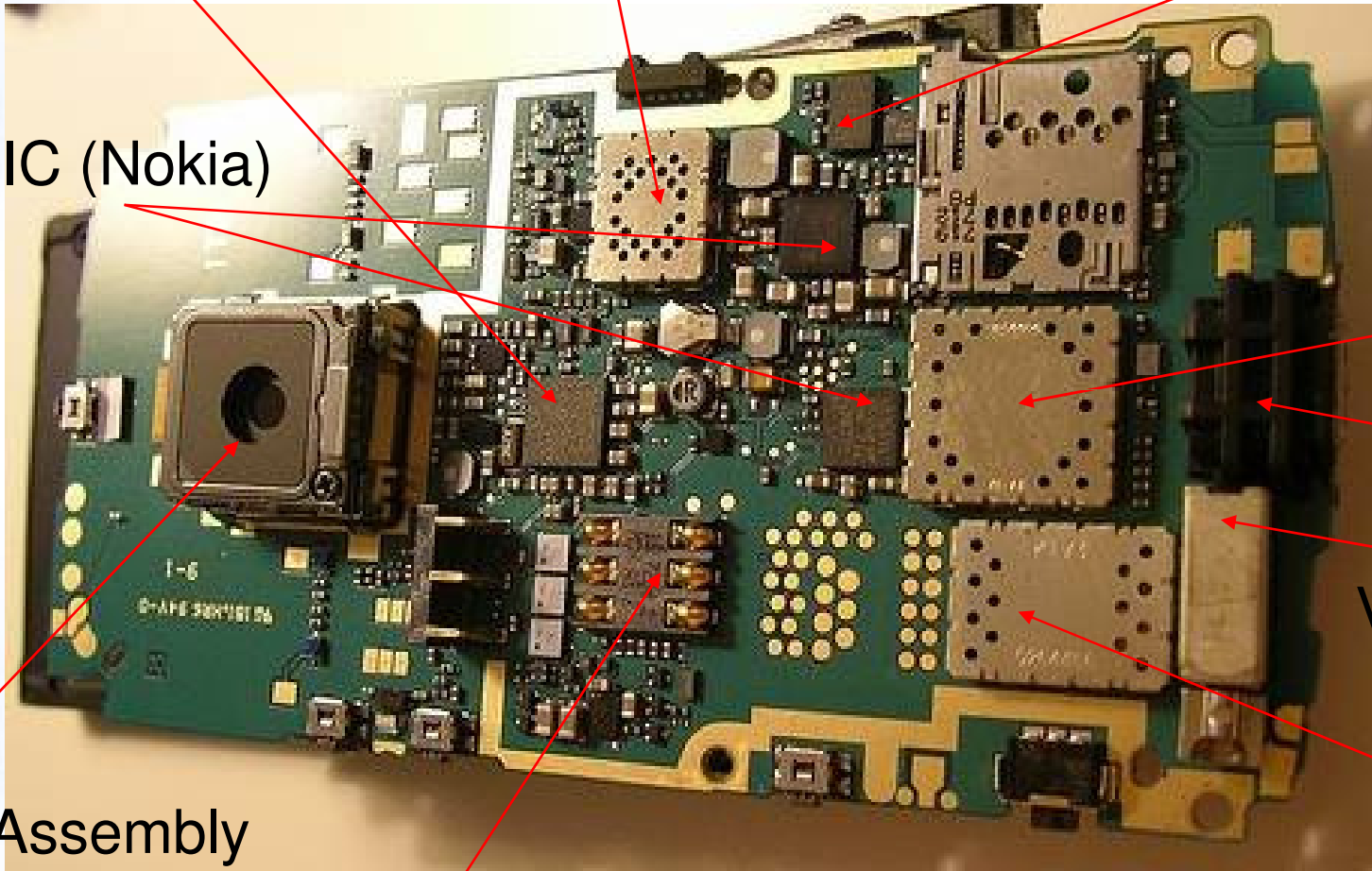
USB port

Vibration motor

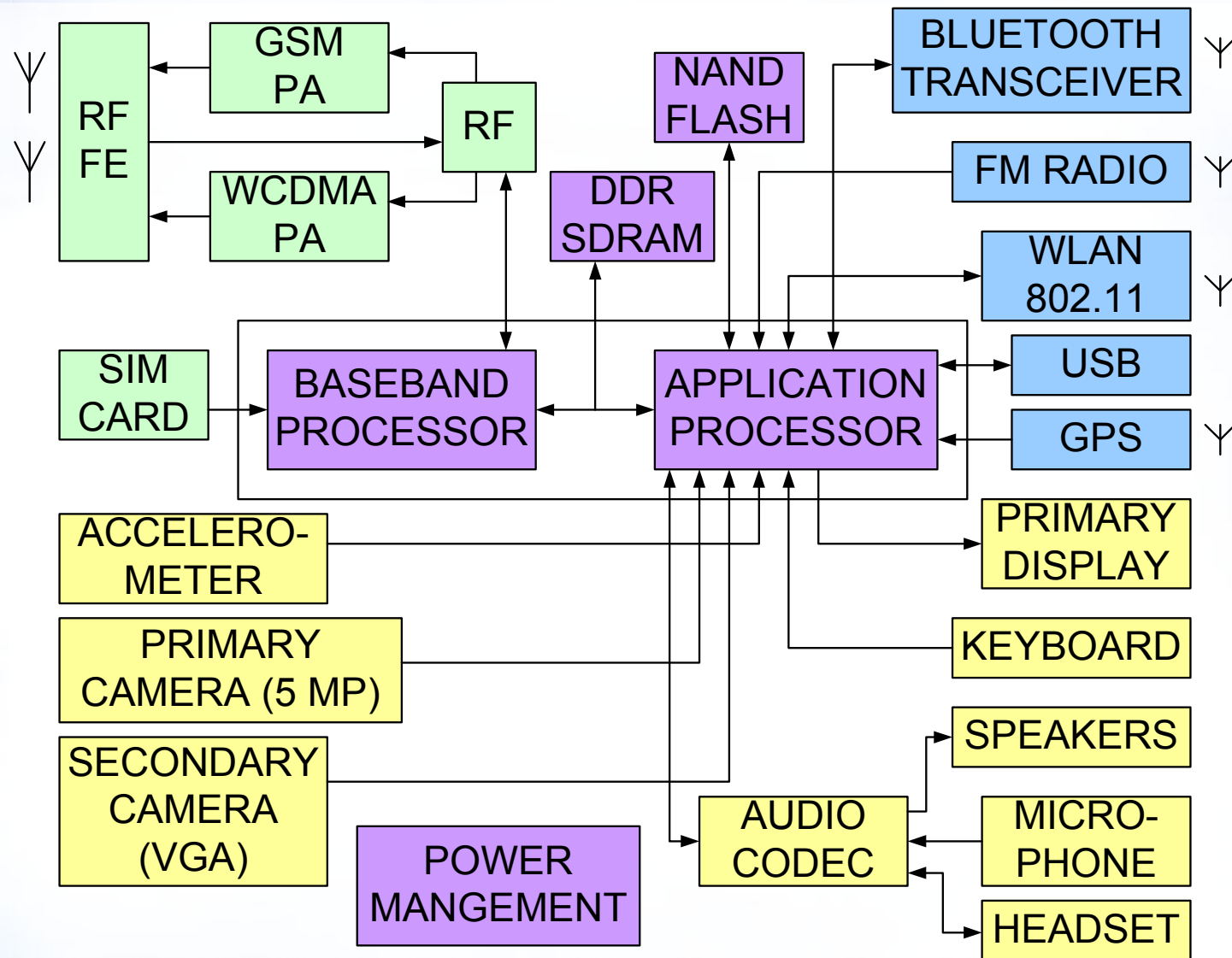
GPS

Camera Assembly

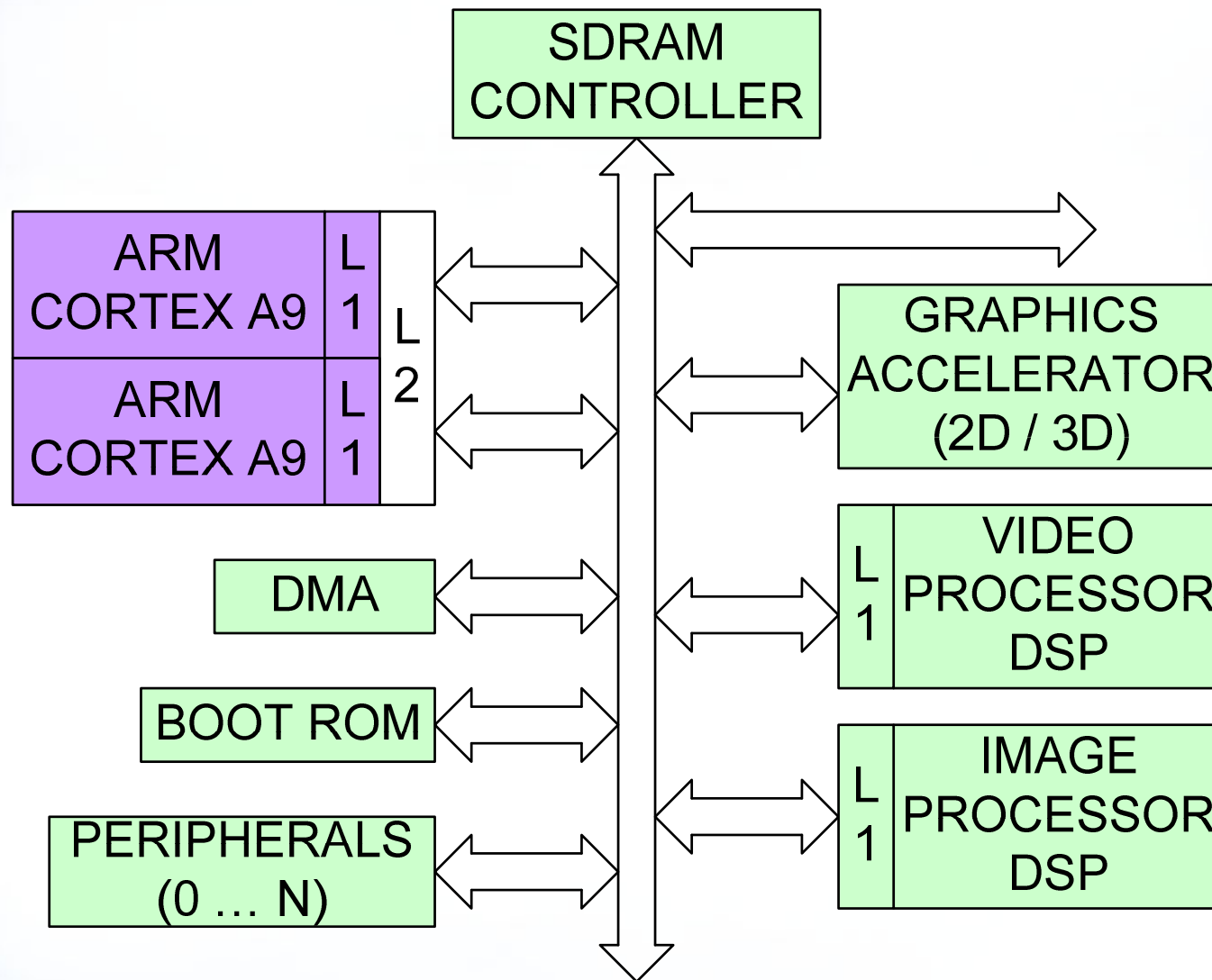
SIM Card Connection



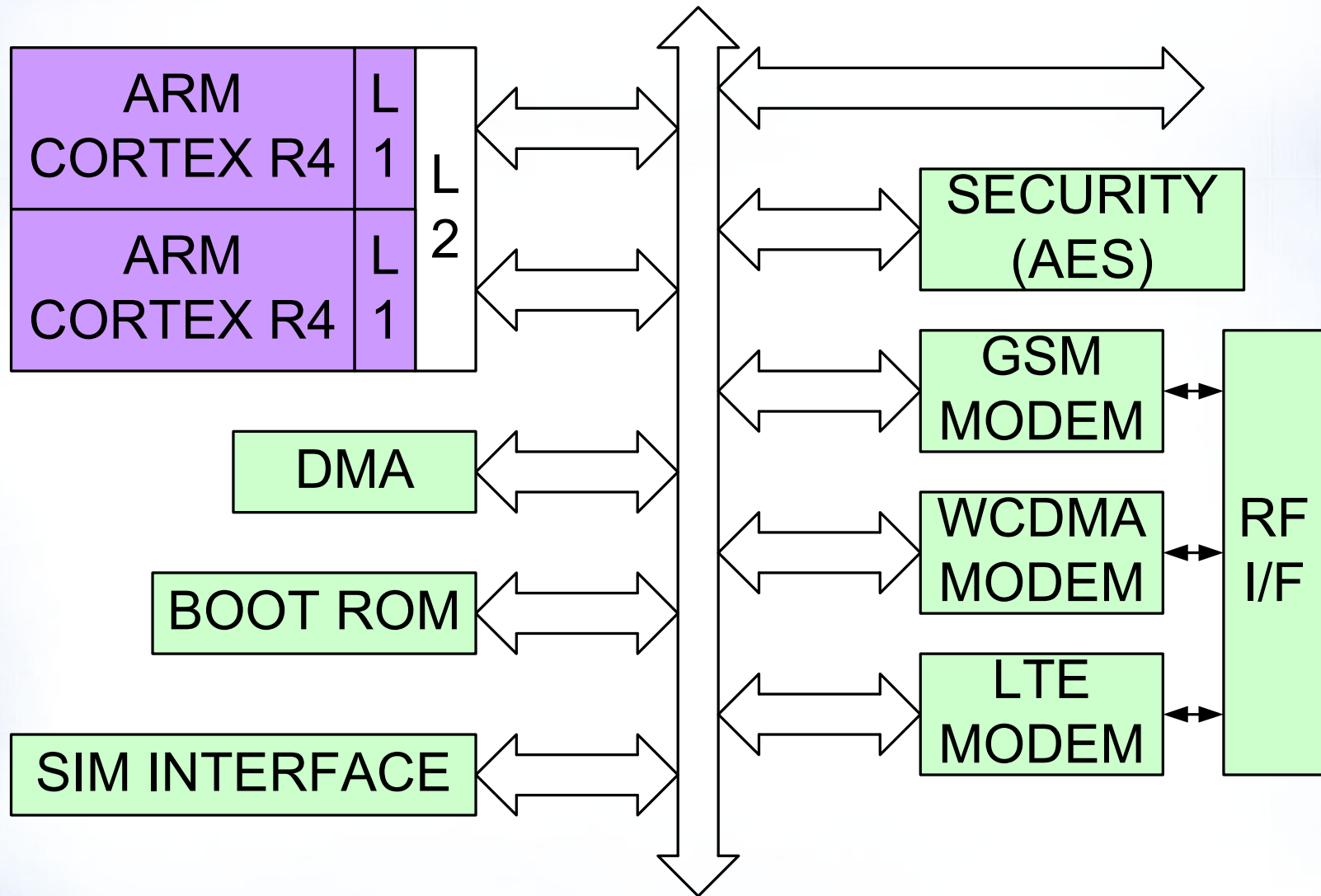
HW Architecture



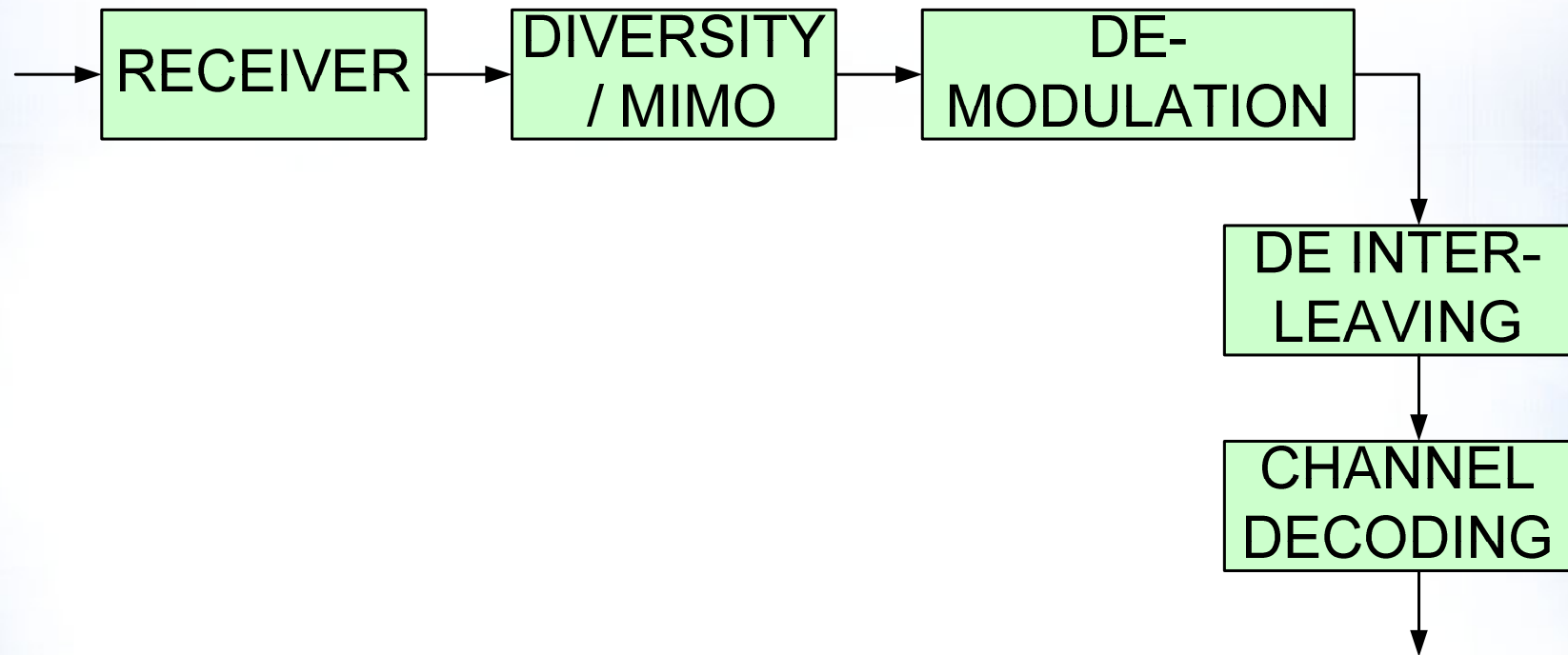
Application Processor



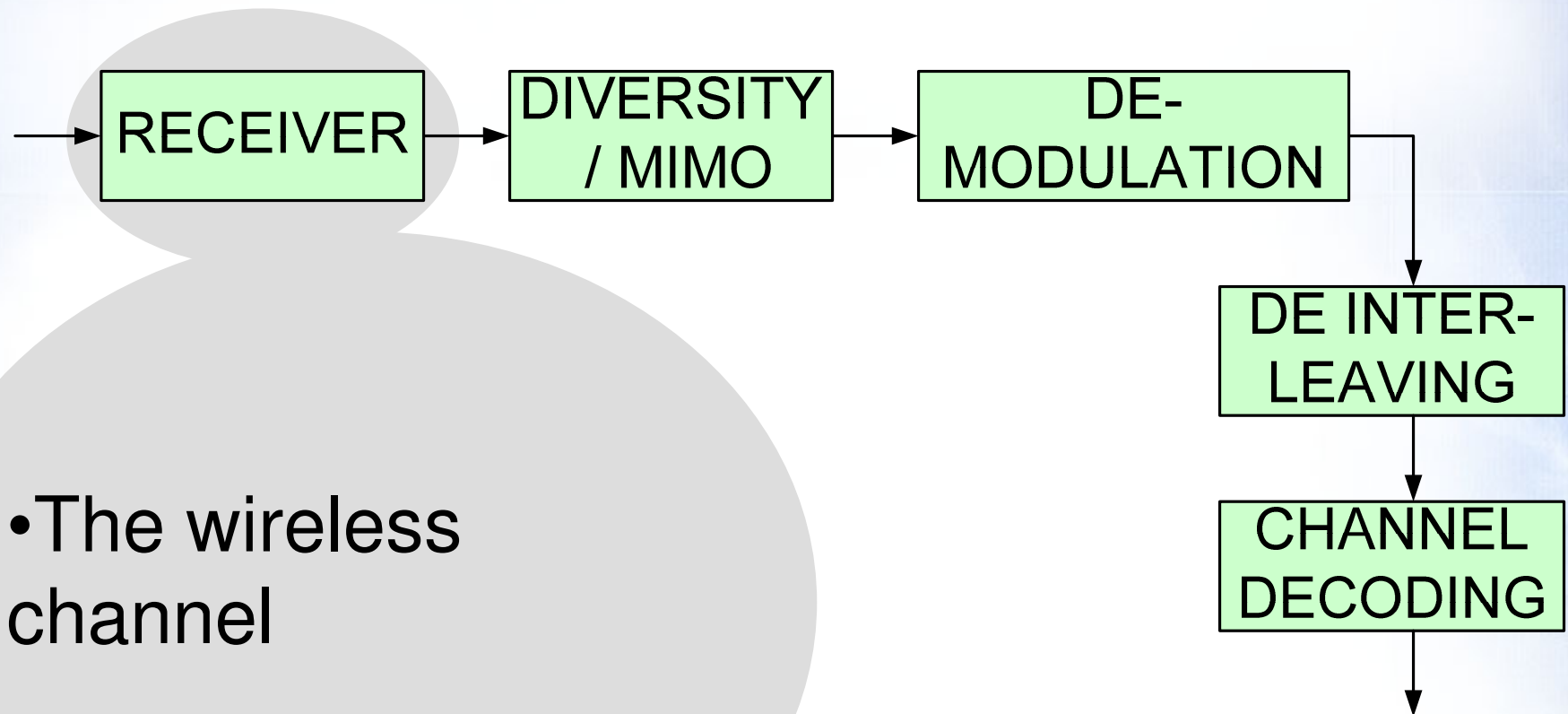
Baseband Processor



Wireless Modem

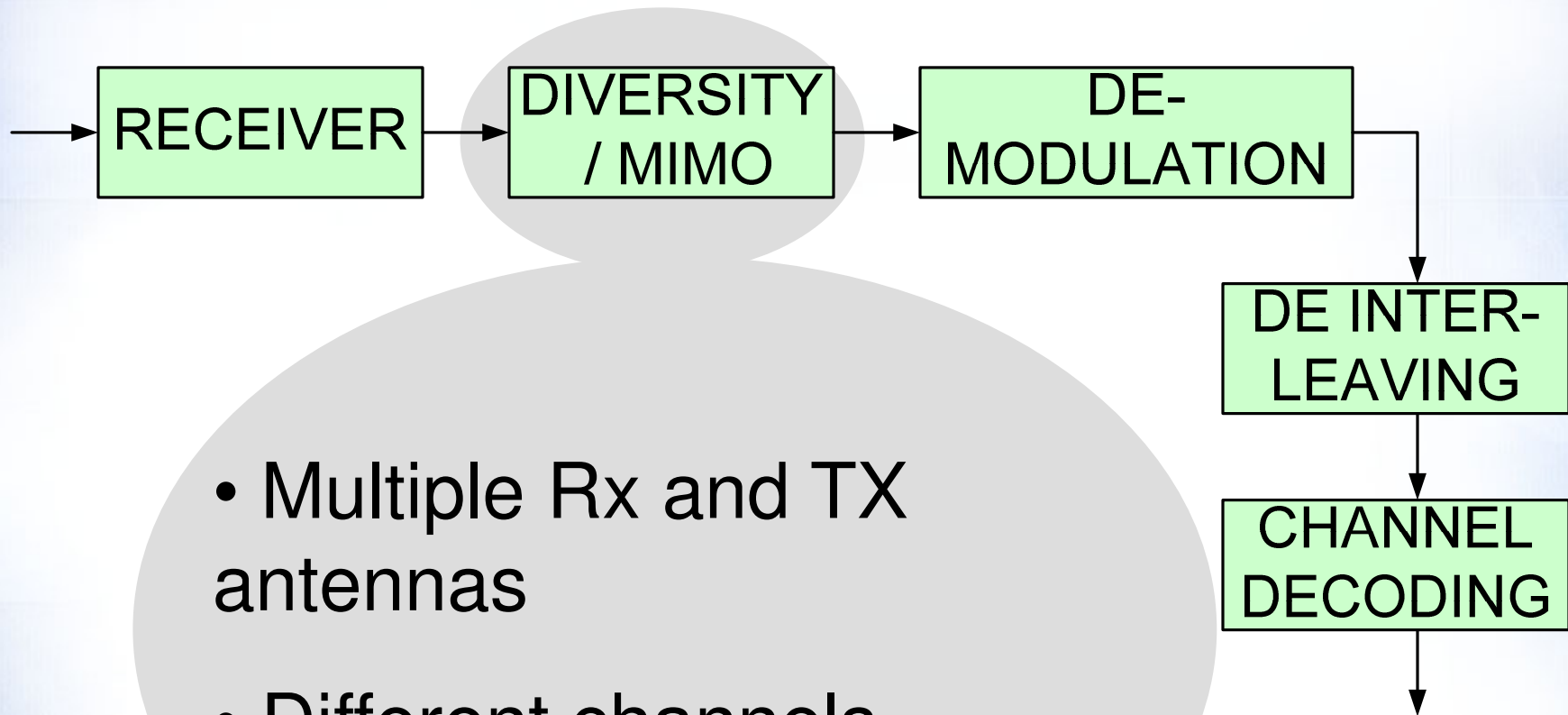


Wireless Modem



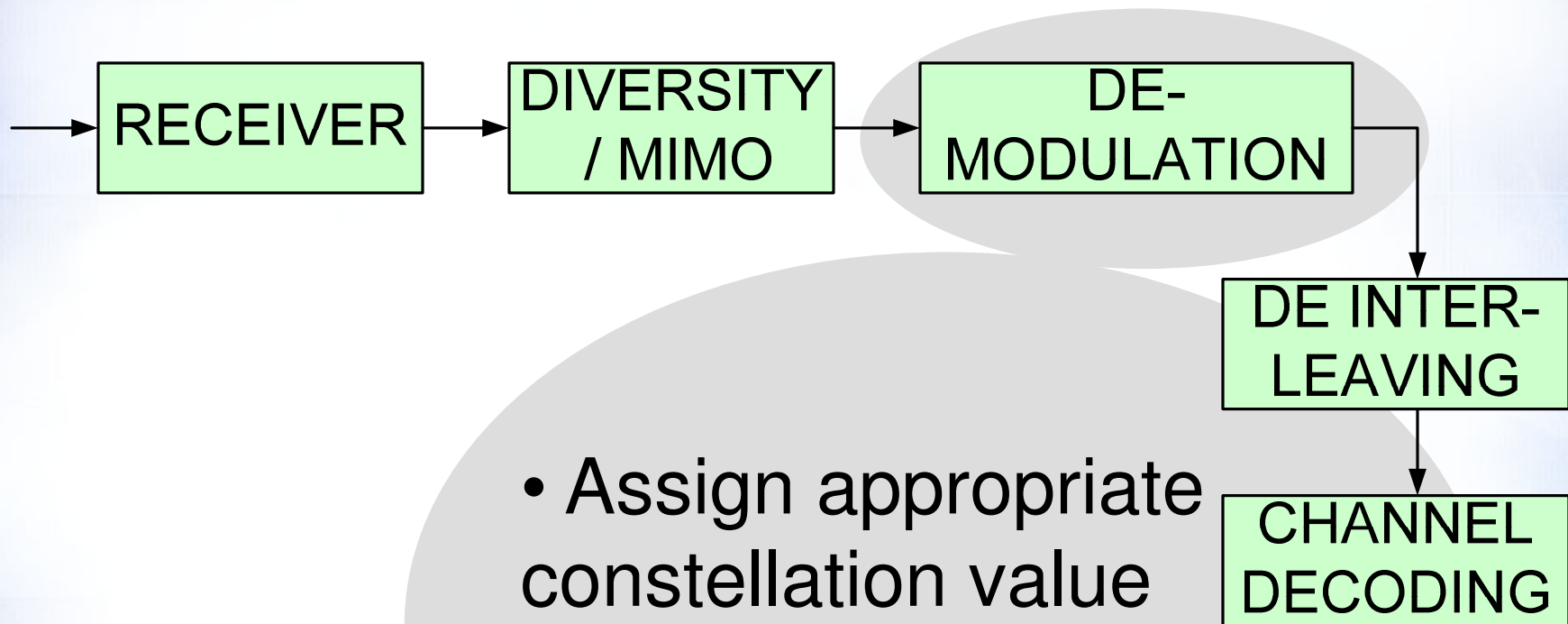
- The wireless channel
- Multipath fading
- Speed

Wireless Modem



- Multiple Rx and TX antennas
- Different channels
- Combining

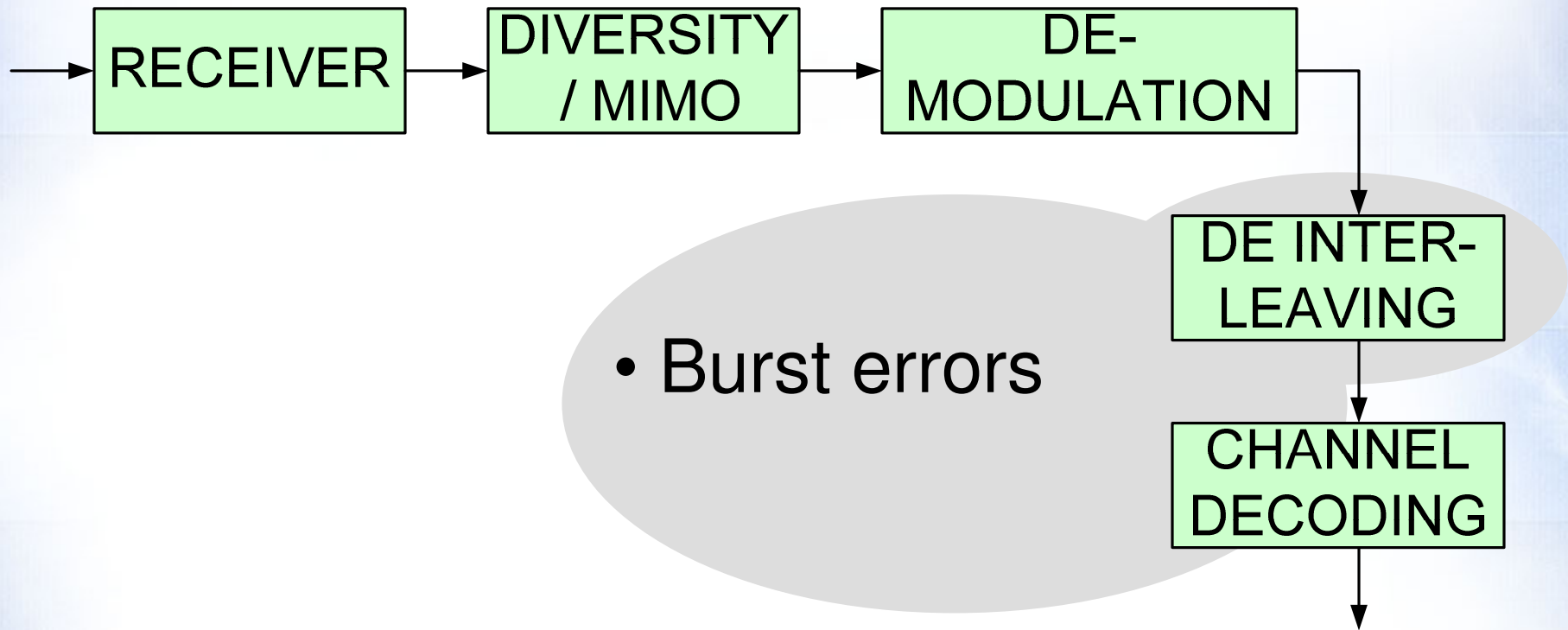
Wireless Modem



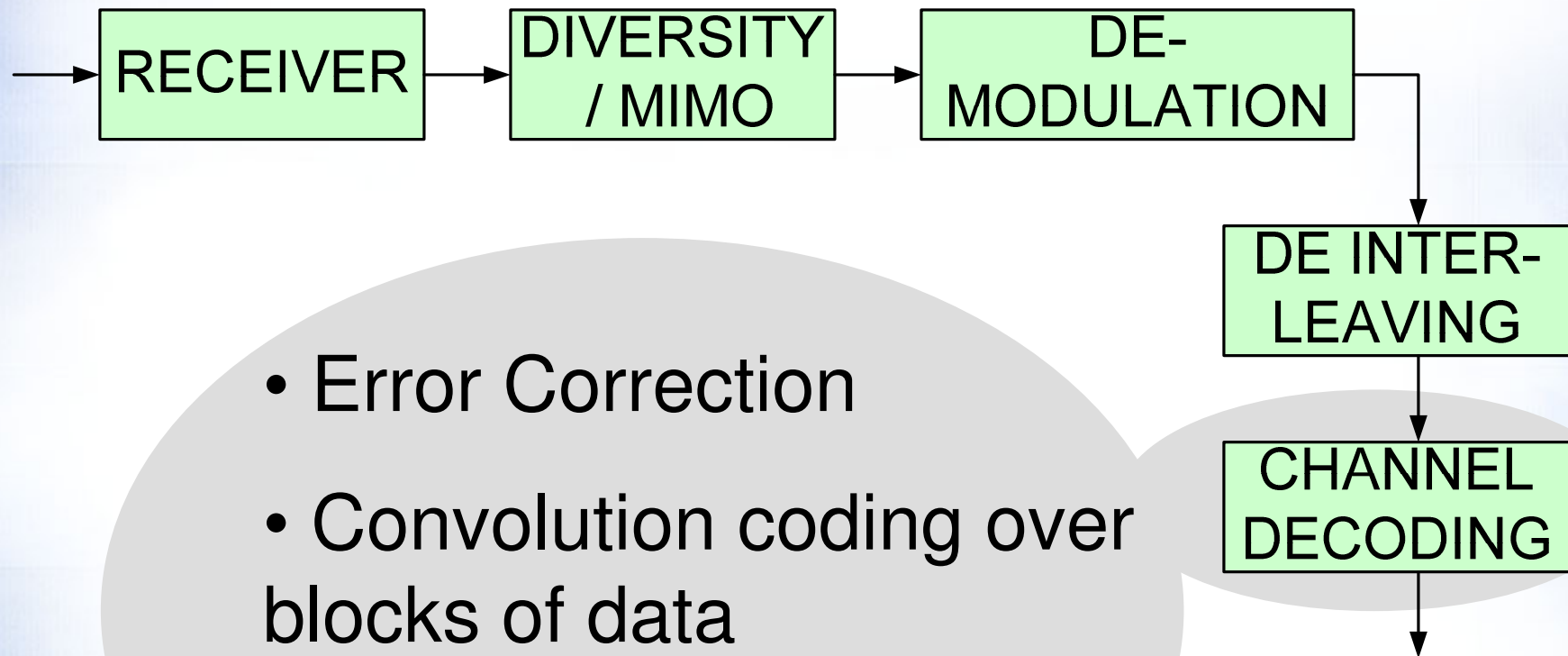
- Assign appropriate constellation value

- QPSK / 16 QAM / 64QAM / 256 QAM

Wireless Modem



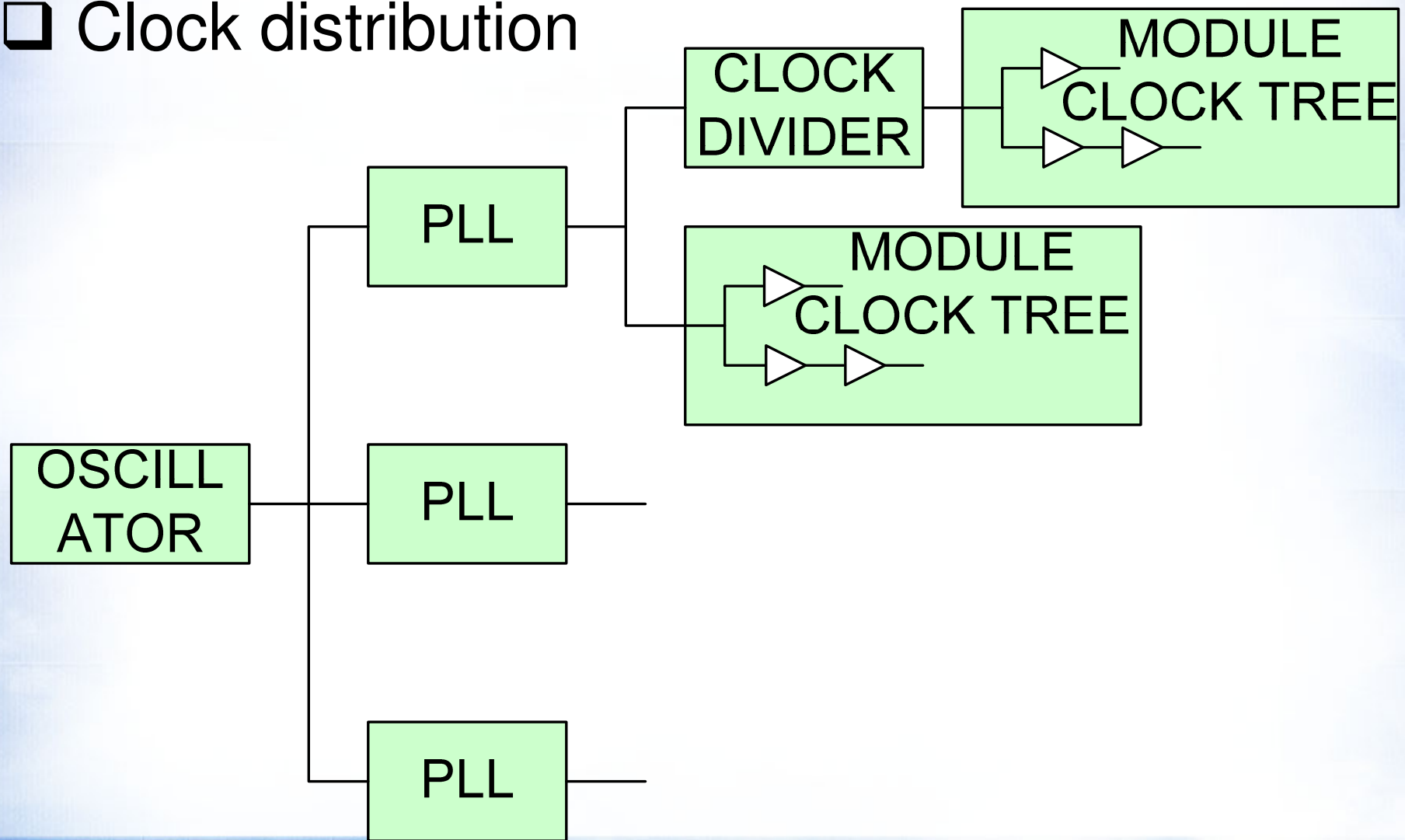
Wireless Modem



- Error Correction
- Convolution coding over blocks of data
 - eg Viterbi, Turbo

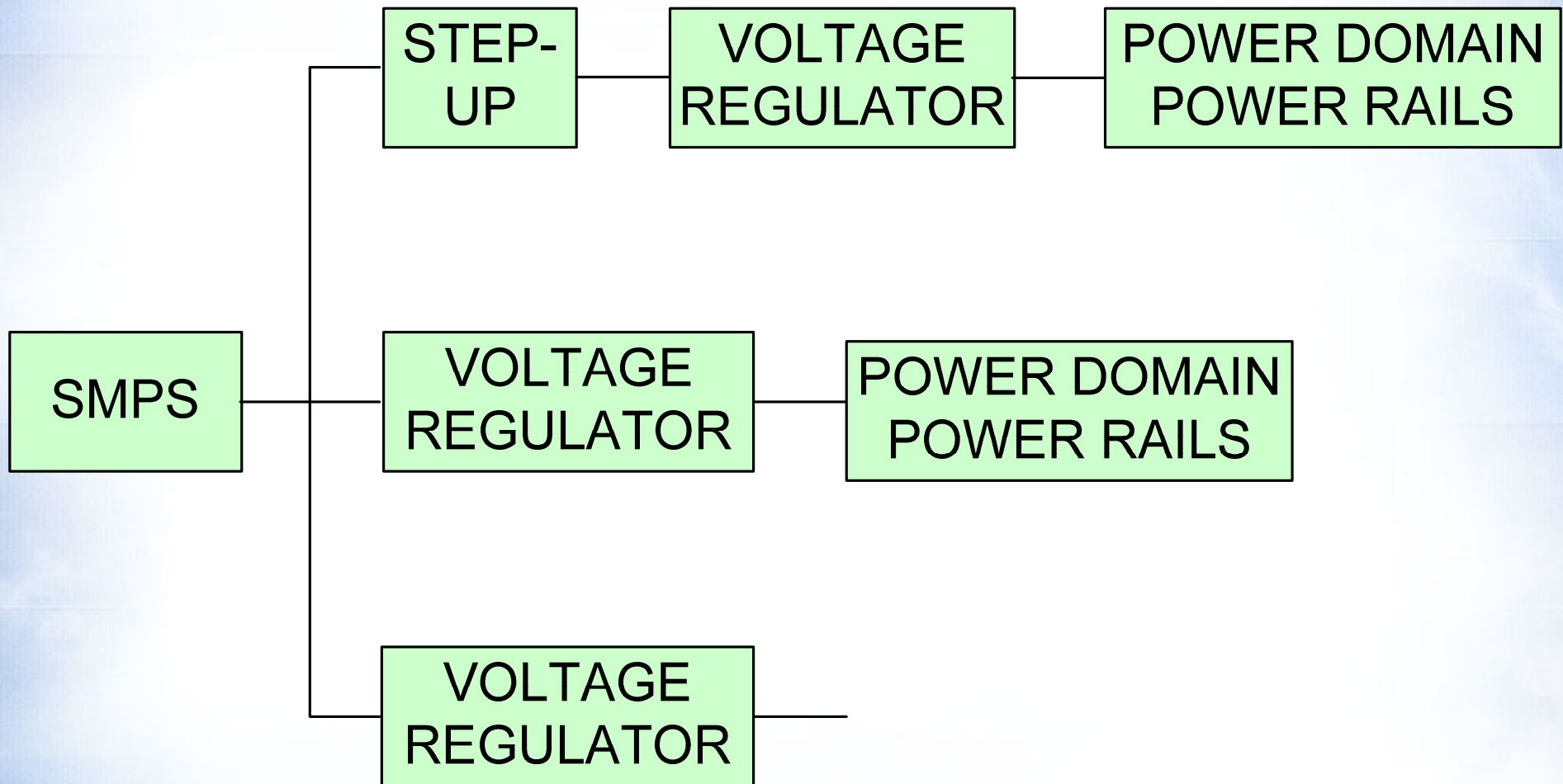
Power Control

❑ Clock distribution



Power Control

□ Power distribution



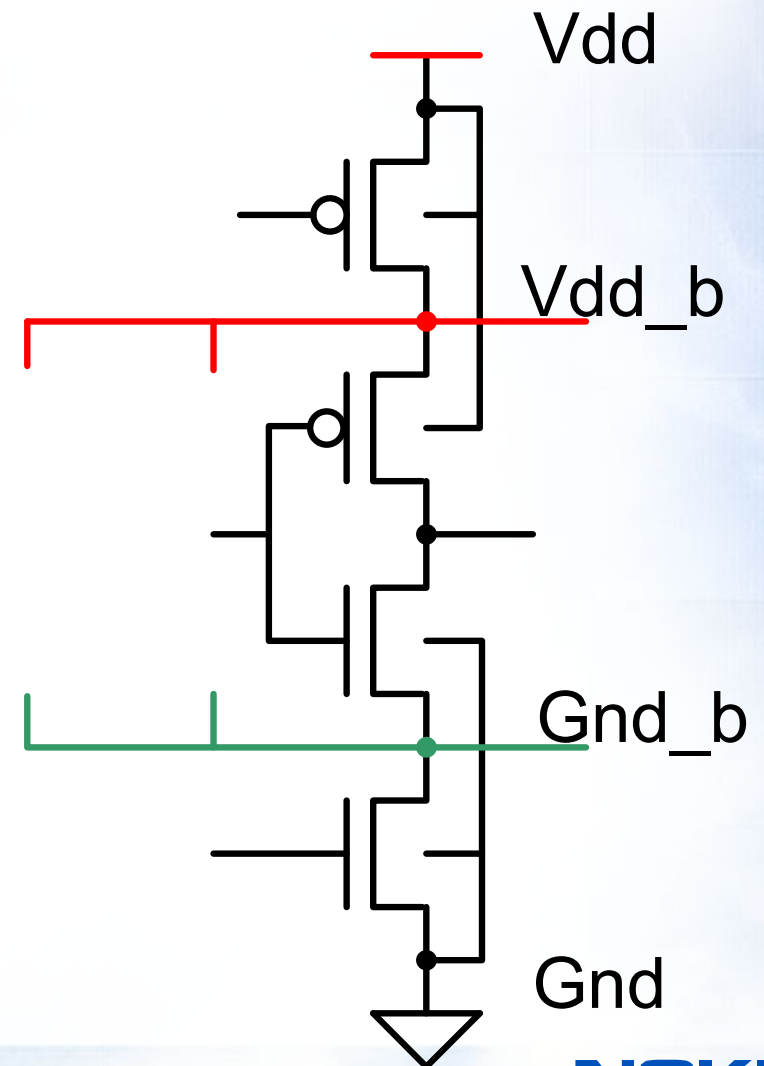
Power Control

- Dynamic Power Reduction
 - Clock gating
 - Module level clock gating
 - Automatic clock gating
 - Frequency Scaling
 - Voltage Scaling

Power Control

❑ Static Power Reduction

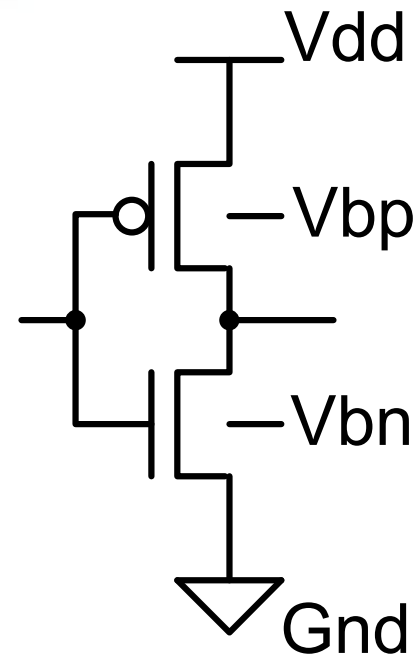
- Multiple independent power domains
- Retention memories
- Source biasing



Power Control

□ Process compensation

- Use of sensors
 - Temperature
 - Process
 - Voltage
- Body biasing



$$V_t = f(V_{dd} - V_{bp})$$

Thank you!

www.discussion.forum.nokia.com (VTU
EDUSAT)