A Cellphone Radio System as a KI Platform
KI #1: Power Supply & Management

periodic signals
semiconductor physics
pn junctions and diodes
time-invariant systems
electrostatic field
dielectric materials
capacitor
KI #2: Back-end Analog Audio System

[Diagram of a back-end analog audio system with components such as input analog audio source, audio amplifier, audio output device as magnetic circuit, and various signal processing blocks like BPF, LO, Mixer, Amp, and LPF.]
KI #3: Back-end Digital Audio System

Power Supply & Management

Antenna & Propagation

RF Frontend

Baseband Backend

A/D & D/A Converters, Amplifiers, and Filters

Video I/O

Audio I/O

storage
KI #5: Radio Signal Receiver

- Use of LC & opamps for BP filtering
- Amps (BW, phase, stability)
- Demodulation (down conversion)
- Amps (BW, phase, stability)
- Filter design with imperfect opamps in the Laplace domain
- Interface of antenna with PCB, waveprop on PCB traces
- BPF
- LNA
- Baseband amp
- LPF
- Oscillator design using LC circuits
- Output baseband signal

Power Supply & Management

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KI #6: Overview of the Whole Radio System and Noise

- Putting everything together for system overview
- Radio receiver sensitivity due to noise
- System level handling of noise in radio under the constraint of radio spectrum allocation
- System design tradeoffs
  - Impact of gain and filter designs on SNR
  - Increasing transmitter power
  - Antenna options to increase receiver input power