An Overview of Mobile Devices

IIIT Sri City

Image source: comodo.com

Dr. Shiv Ram Dubey

Type of Mobile Devices

Type of Mobile Devices

- Personal Digital Assistant (PDA)
- Smartphones
- Tablets
- Laptops
- Smart Bands
- and many more …

What Is A Mobile Handset?

What Is A Mobile Handset?

- A mobile handset (*handset*) is an electronic device that provides services to users, *e.g.*:
  - Managing address book
  - Scheduling calendar
  - Cellular telephony
  - Accessing Internet, email

What Is A Mobile Handset?

- A mobile handset (*handset*) is an electronic device that provides services to users, *e.g.*:
  - Managing address book
  - Scheduling calendar
  - Cellular telephony
  - Accessing Internet, email

What Is A Mobile Handset?

- A mobile handset (*handset*) is an electronic device that provides services to users, *e.g.*:
  - Managing address book
  - Scheduling calendar
  - Cellular telephony
  - Accessing Internet, email

Example handsets:
Apple iPhone, BlackBerry Storm, Redmi Note5 Pro

Source: Dong Xuan

What’s Inside a Mobile Handset?


NOKIA
Image Source: ibtimes.com

What's Inside a Mobile Handset?

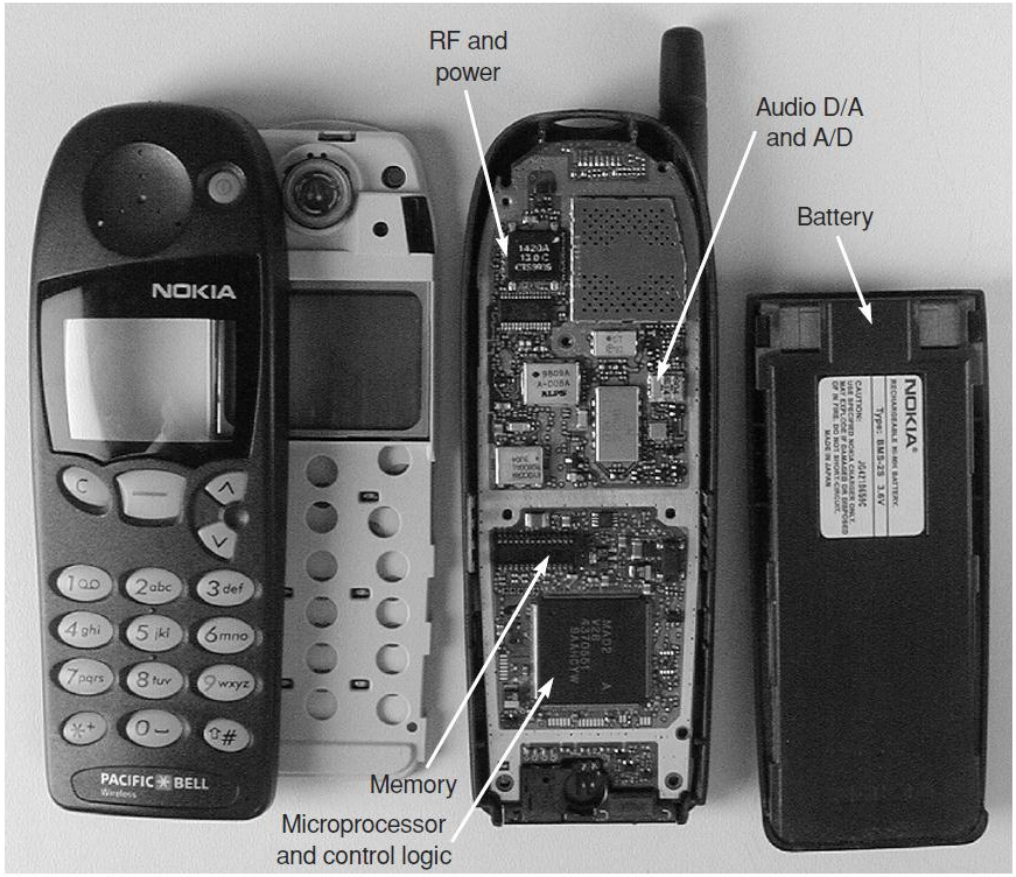


Figure D.17 Circuit board from a Nokia cell phone. (Courtesy HowStuffWorks, Inc.)

RF Power Amplifier - A **radio frequency power** amplifier

Source: J. L. Hennessy and D. A. Patterson, *Computer Architecture: A Quantitative Approach*

Handset Architecture

- Handsets use several hardware components:
  - Microprocessor
  - ROM
  - RAM
  - Digital signal processor
  - Radio module
  - Microphone and speaker
  - Hardware interfaces
  - LCD display

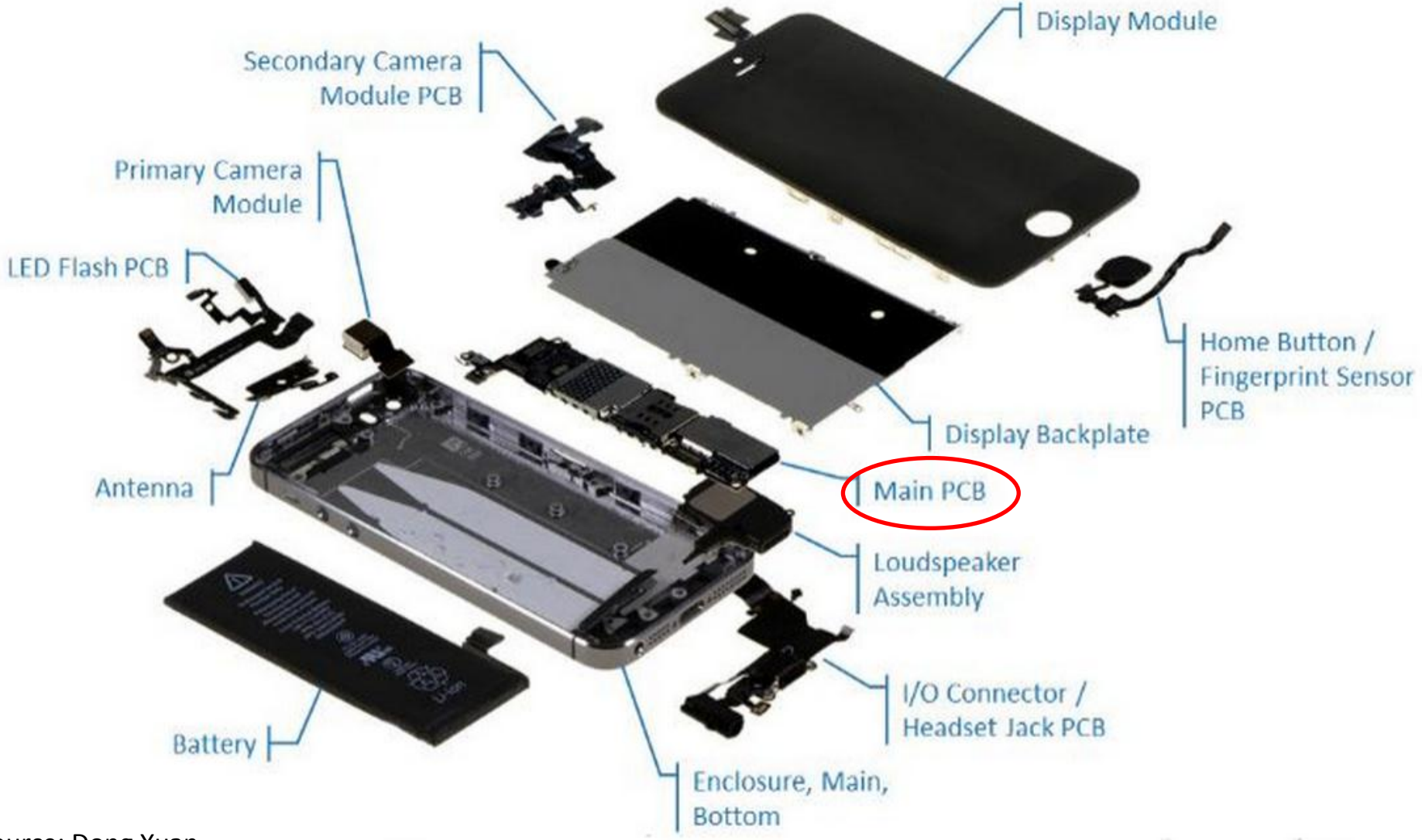
Handset Architecture

- Handsets store system data in electronically-erasable programmable read-only memory (EEPROM)
  - Service providers can reprogram phones without requiring physical access to memory chips
- OS is stored in ROM (nonvolatile memory)
- Most handsets also include *subscriber identity module* (SIM) cards

Focused Mobile Handset: Smartphone

- We will take smartphone as an example to discuss mobile handset hardware architecture
- Smartphone is a new generation high featured and multifunctional cell phone which has
  - The functionalities of a handheld computer
  - The communication capabilities of a cell phone
  - Multiple sensors

A Teardown of iPhone 5S



Source: Dong Xuan

Main PCB

Main PCB

- PCB stands for Printed Circuit Board

Main PCB

- Smartphone main PCB has three main parts

Main PCB

- Smartphone main PCB has three main parts
  - An application processor which executes users' application software

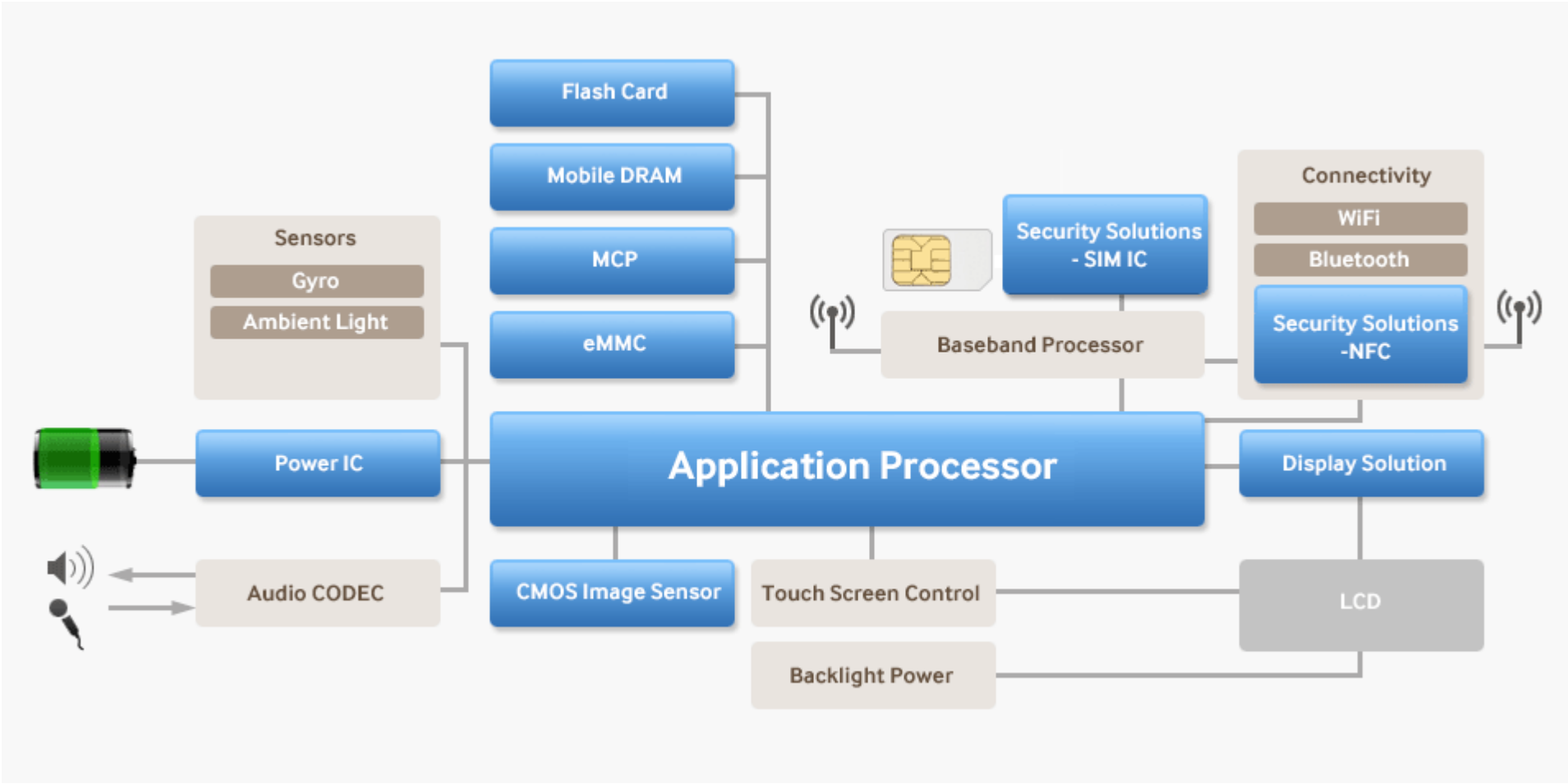
Main PCB

- Smartphone main PCB has three main parts
  - An application processor which executes users' application software
  - A baseband processor which controls radio activities

Main PCB

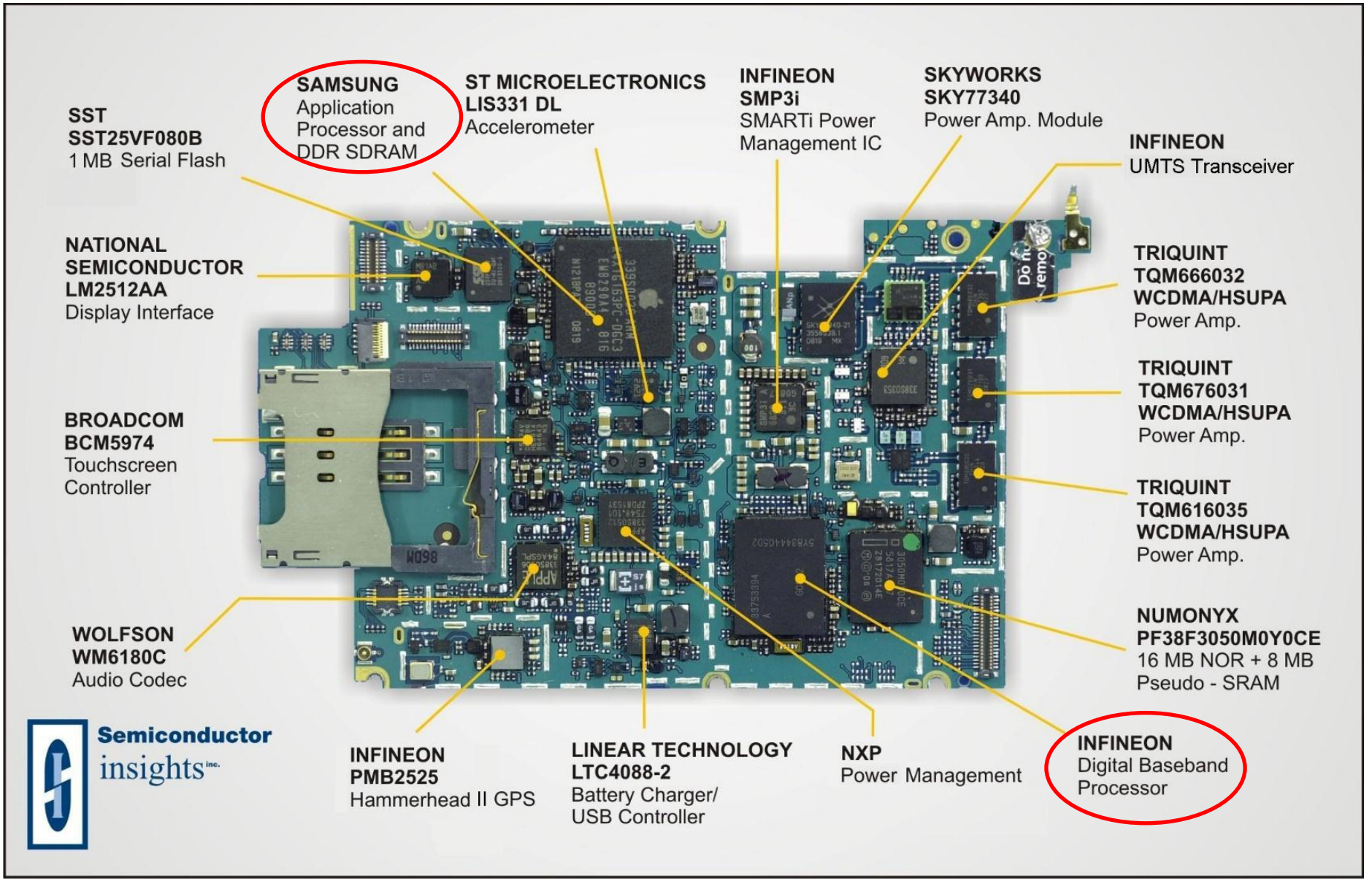
- Smartphone main PCB has three main parts
  - An application processor which executes users' application software
  - A baseband processor which controls radio activities
  - A number of peripheral devices for interacting with the user

Main PCB Architecture



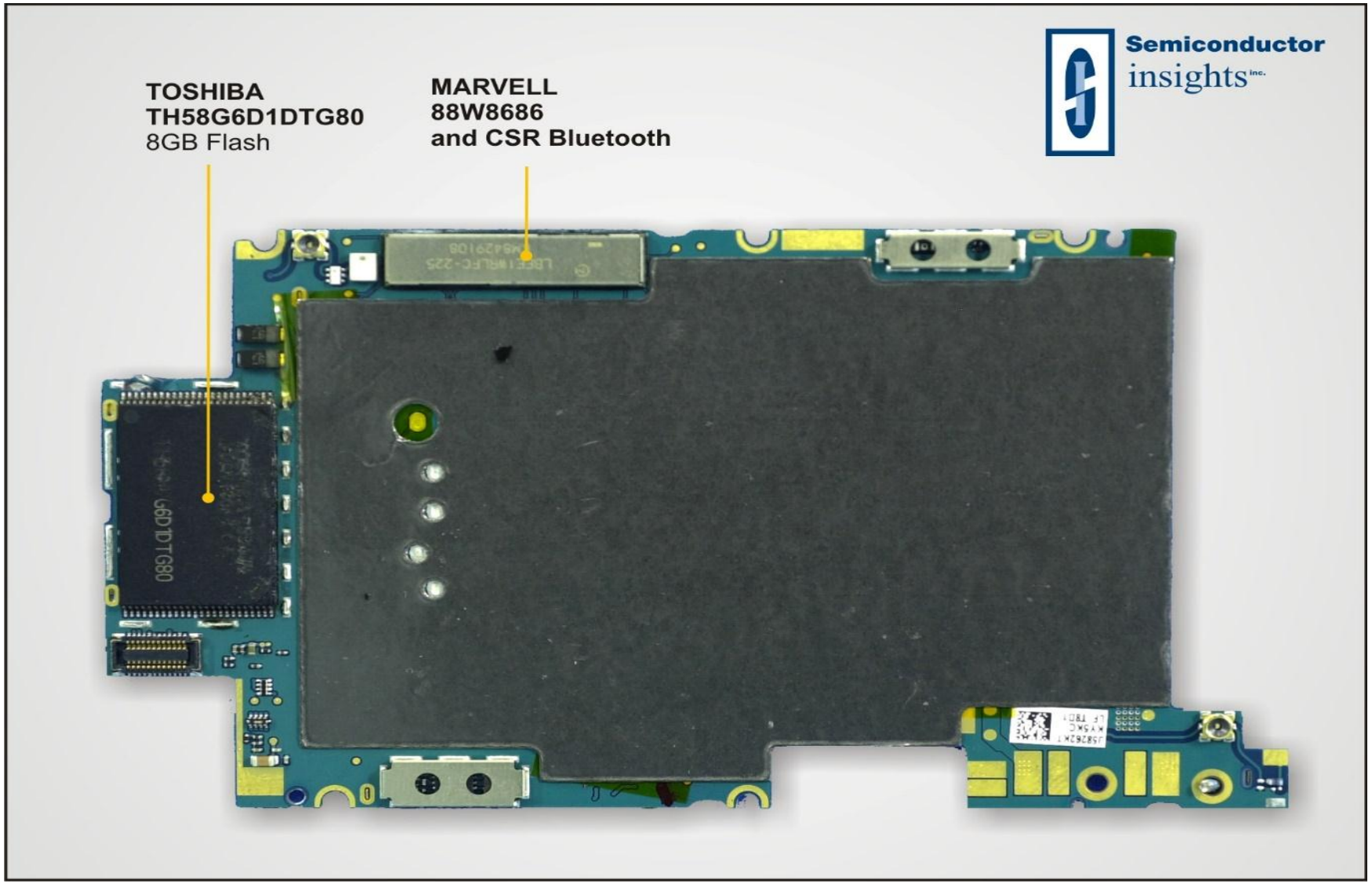
Source: Dong Xuan

An Example – iPhone 3G Main PCB Front



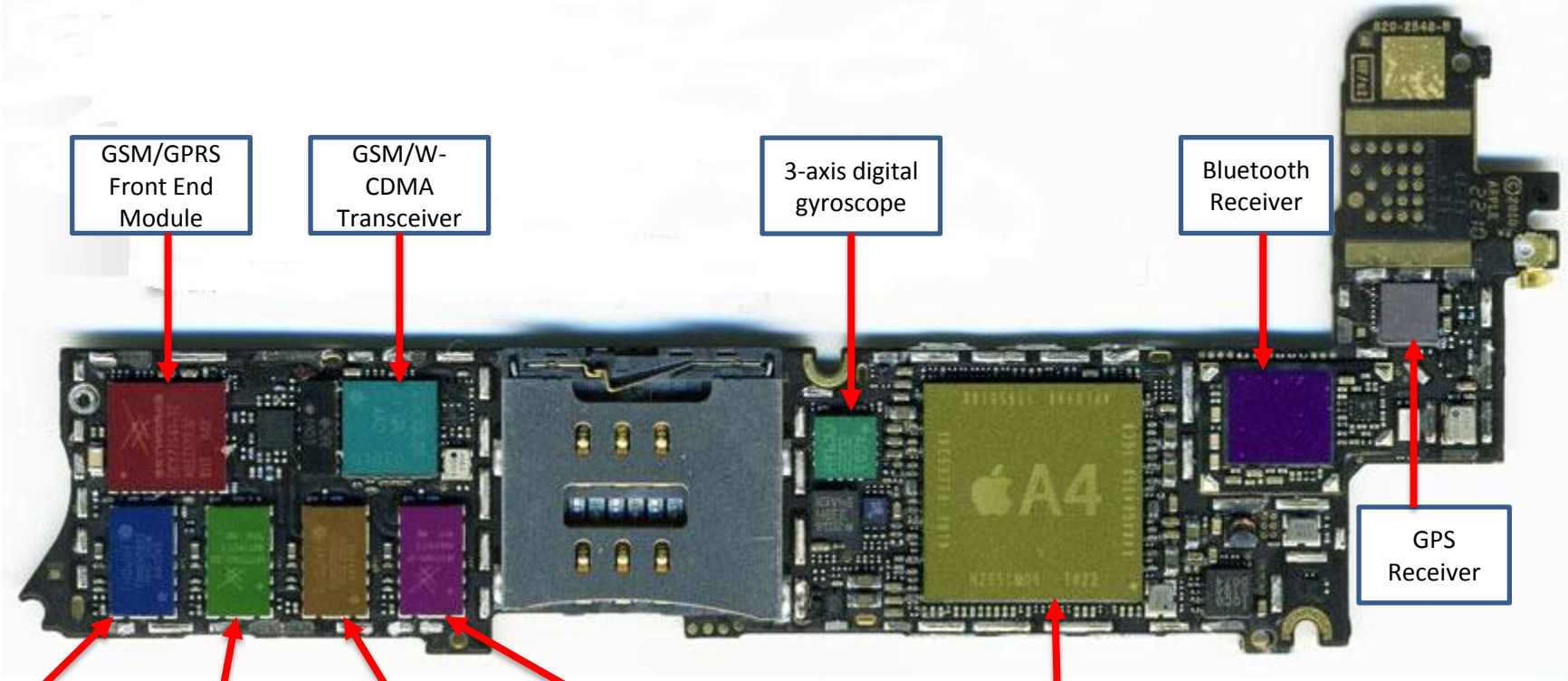
Source: Dong Xuan

An Example – iPhone 3G Main PCB Back



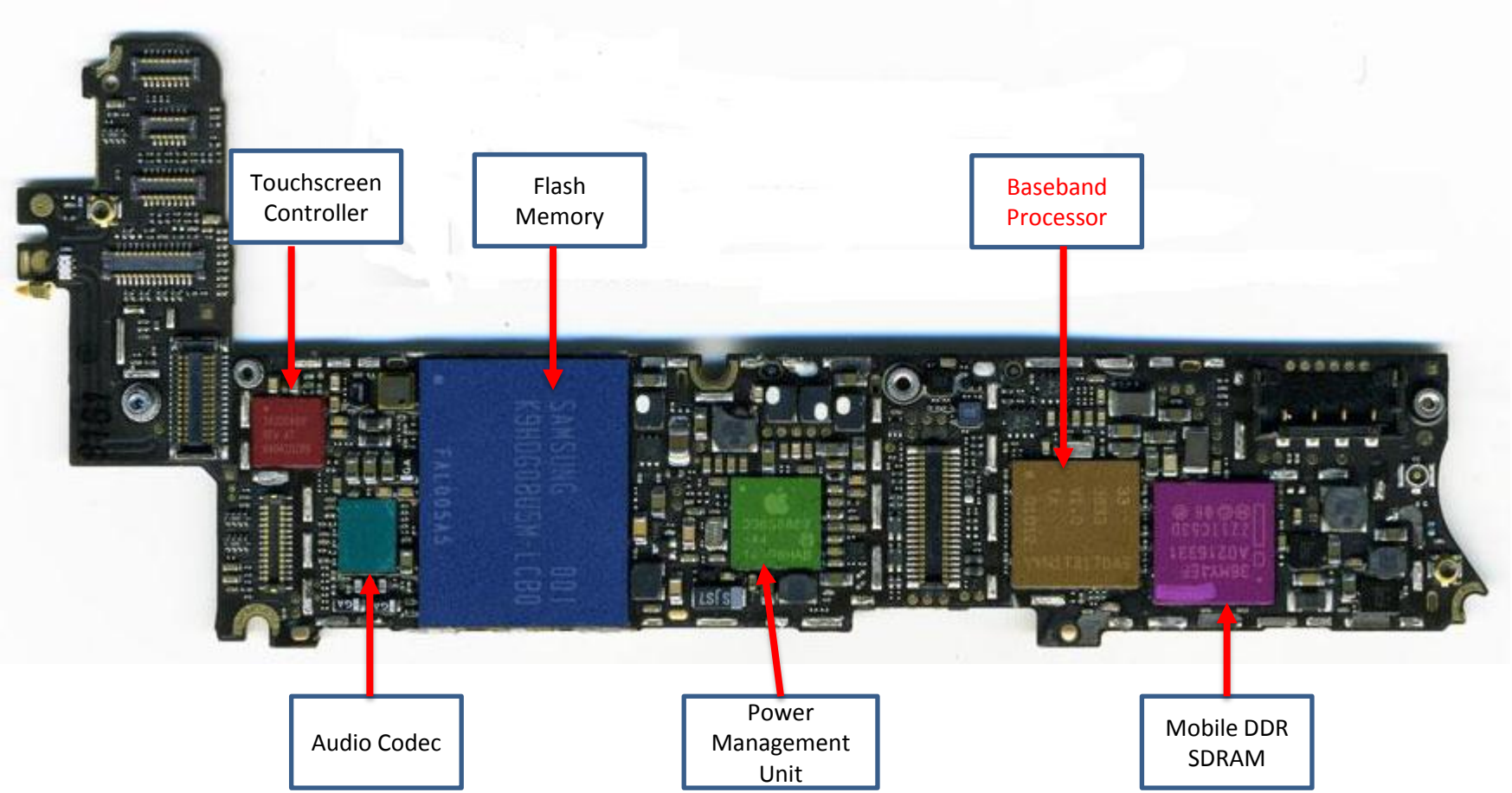
Source: Dong Xuan

Another Example – iPhone 4 Main PCB Front



Source: Dong Xuan

Another Example – iPhone 4 Main PCB Back



Source: Dong Xuan

Application Processor: Overview

- A dedicated processor which enables smartphone to run mainstream OS such as Android, iOS and Windows Mobile etc.
- Optimized to run a number of user applications
- Emphasize multimedia processing (audio/video/still image/2D/3D)
- Do not handle “baseband” (wireless communications)

Application Processor: Components

- **Processor core** (e.g. ARM based processor)
  - which is specifically optimized for minimal power consumption
- **Multimedia engine**
  - which is hardware implementation of one or more multimedia standards (e.g. JPEG module, MPEG module, Audio module)
- **Device interfaces**
  - which are used to communicate with peripheral device (e.g. USB, camera, display)

Thanks