Overview of Android Hardware Abstraction Layer

Android Hardware Abstraction Layer (HAL)

C++/C

HARDWARE ABSTRACTION LAYER

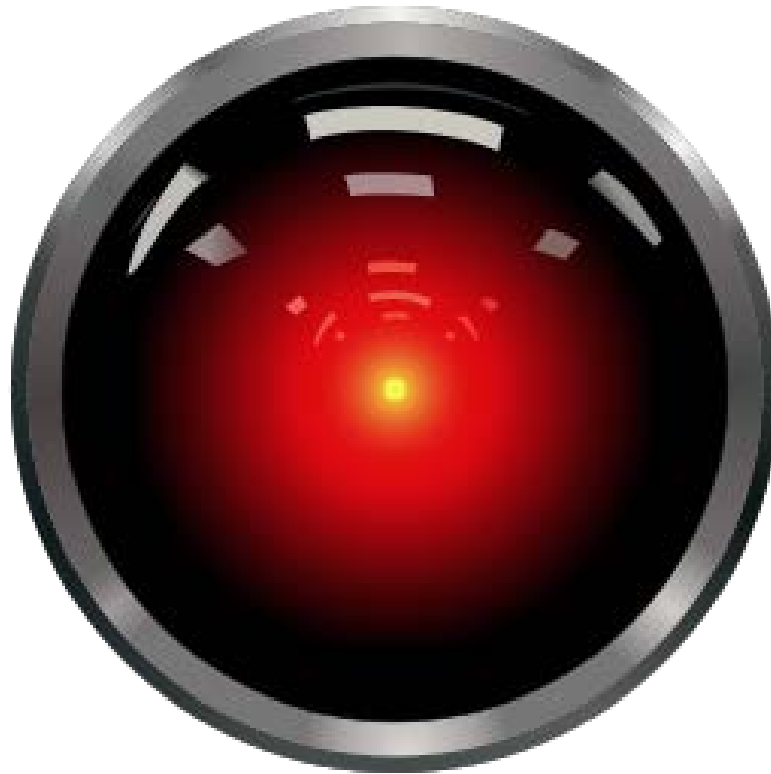Graphics · Audio · Camera · Bluetooth · GPS · Radio (RIL) · WiFi · ...

See en.wikipedia.org/wiki/HAL_9000

Android Hardware Abstraction Layer (HAL)

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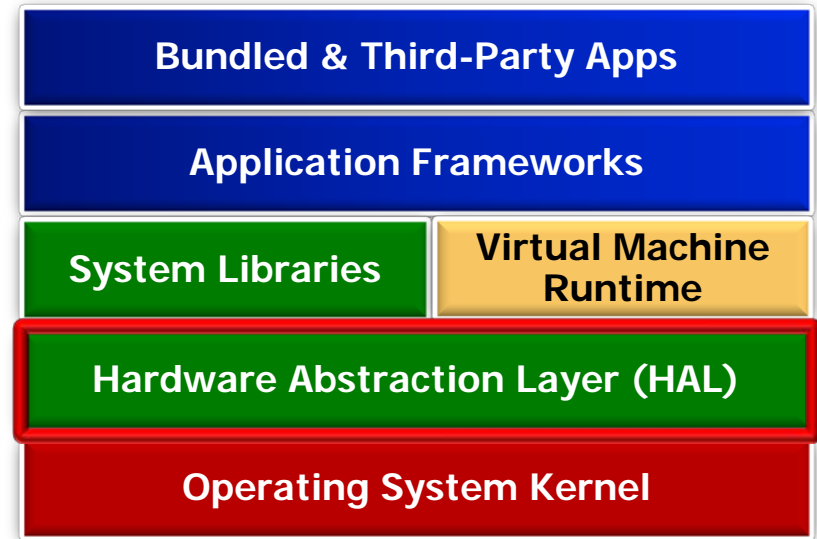## HARDWARE ABSTRACTION LAYER

| Graphics | Audio | Camera | Bluetooth | GPS | Radio (RIL) | WiFi | ... |

- The Android HAL is a *user space* C/C++ library layer

Bundled & Third-Party Apps
Application Frameworks

System Libraries	Virtual Machine Runtime

Hardware Abstraction Layer (HAL)
Operating System Kernel

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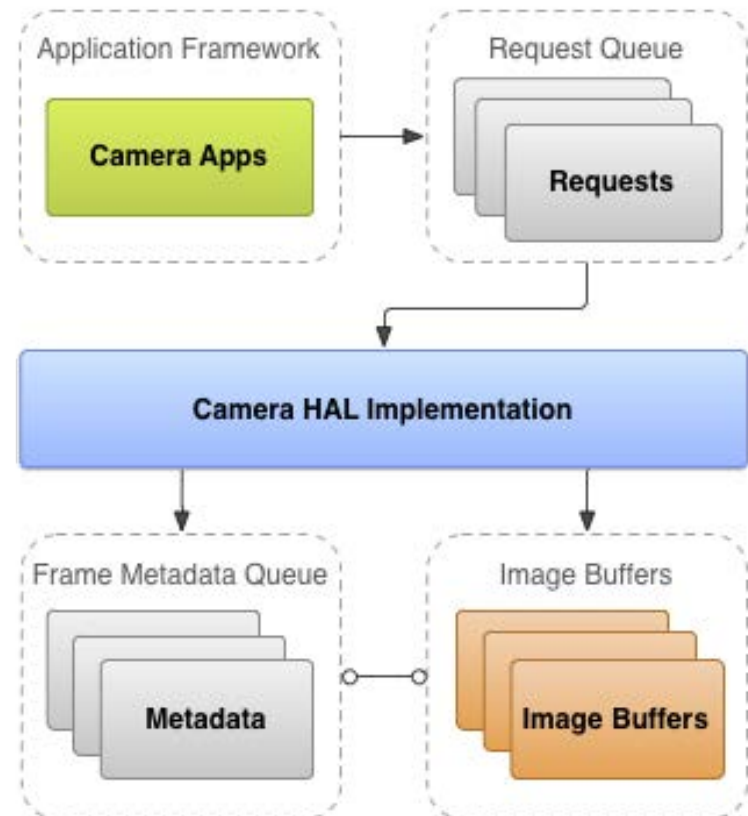
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  - It defines the interface that Android requires hardware "drivers" to implement

Application Framework → Request Queue

Camera Apps → Requests

Camera HAL Implementation

Frame Metadata Queue — Metadata

Image Buffers — Image Buffers

See www.dre.vanderbilt.edu/~schmidt/PDF/Android-HAL.pdf

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C++/C HARDWARE ABSTRACTION LAYER
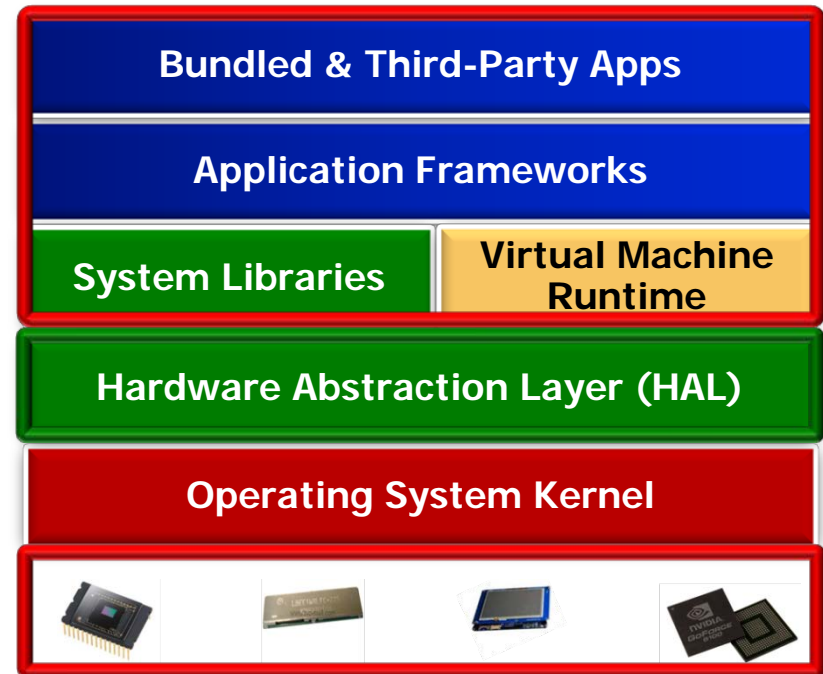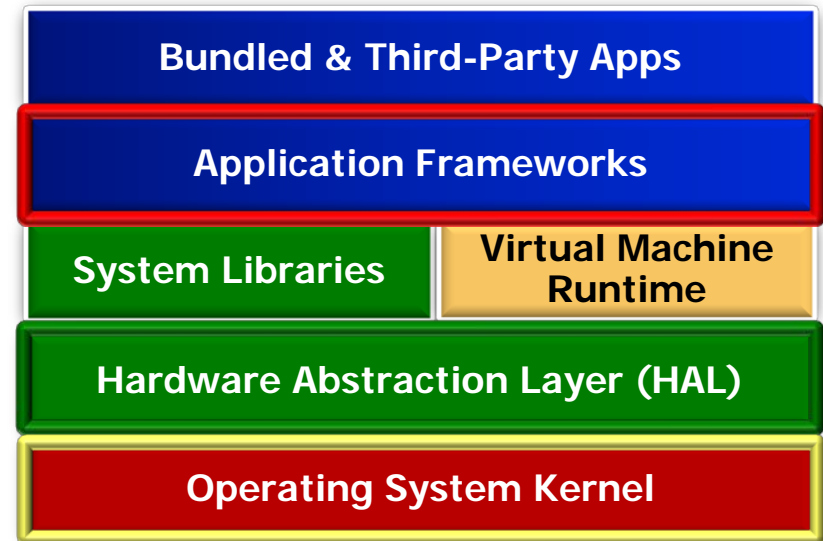
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  - Android platform logic from hardware
  - Android framework layer from the operating system layer

Bundled & Third-Party Apps

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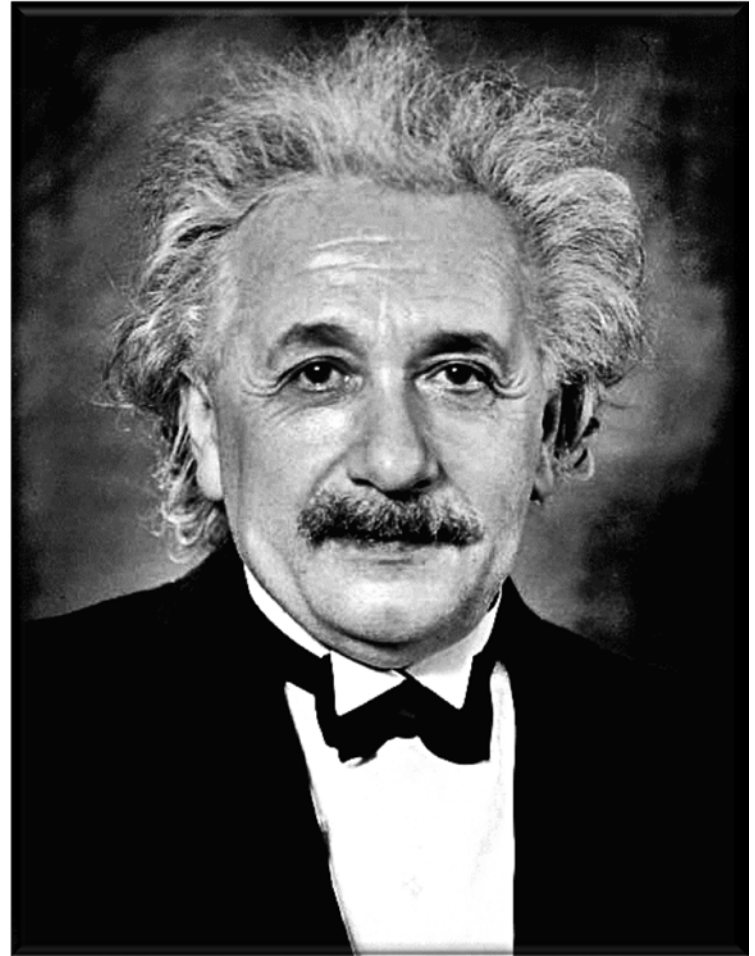
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  - e.g., the radio interface isn't supported in a standard way by Linux device drivers

Applications

Phone Application

| Call Tracker | SMS Dispatch | Service Tracker | Data Tracker |

Application Framework

Phone
/java/android/telephony

RIL
/java/android/telephony/gsm

Libraries (user space)

Unix

Radio Daemon (rild)
/commands/rild

Vendor RIL
system/libs/libril-vendor.so

Linux Kernel

Packet Service

Linux IP Stack

Voice and Control

Packet Driver
PPP, for example

Baseband

Baseband

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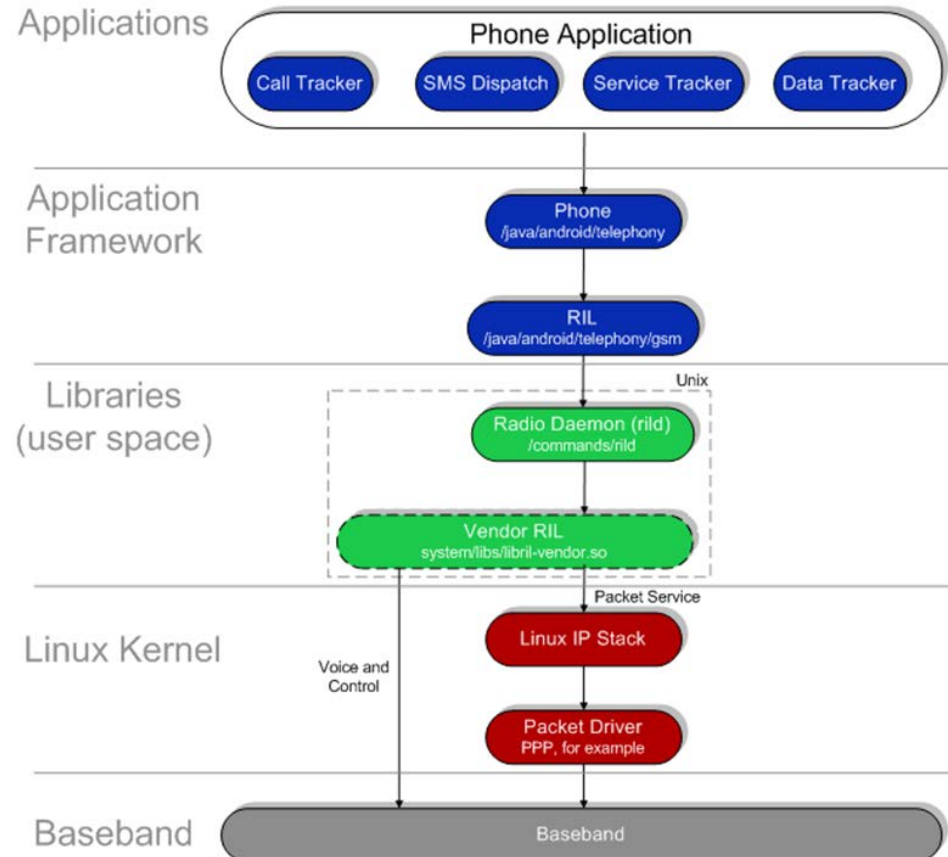Graphics | Audio | Camera | Bluetooth | GPS | Radio (RIL) | WiFi | ...

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-

GPL 3
Free Software
Free as in Freedom

See en.wikipedia.org/wiki/GNU _General_Public_License

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HAL component implementations are often *not* open-source