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*Android 10.0*

# Camera介绍

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| 版本号  | 日期         | 注释  |
|------|------------|---|
| V1.0 | 2019/11/07 | 初稿  |
| V1.1 | 2020/3/19  | 1. 产品使用信息增加UIS7862<br>2. 更新文档名为《Andriod10.0 Camera Introduction》<br>3. 优化文档格式 |
| V1.2 | 2020/9/10  | 更新文档格式  |

# 关键字

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**关键字：**Android 10、Camera。

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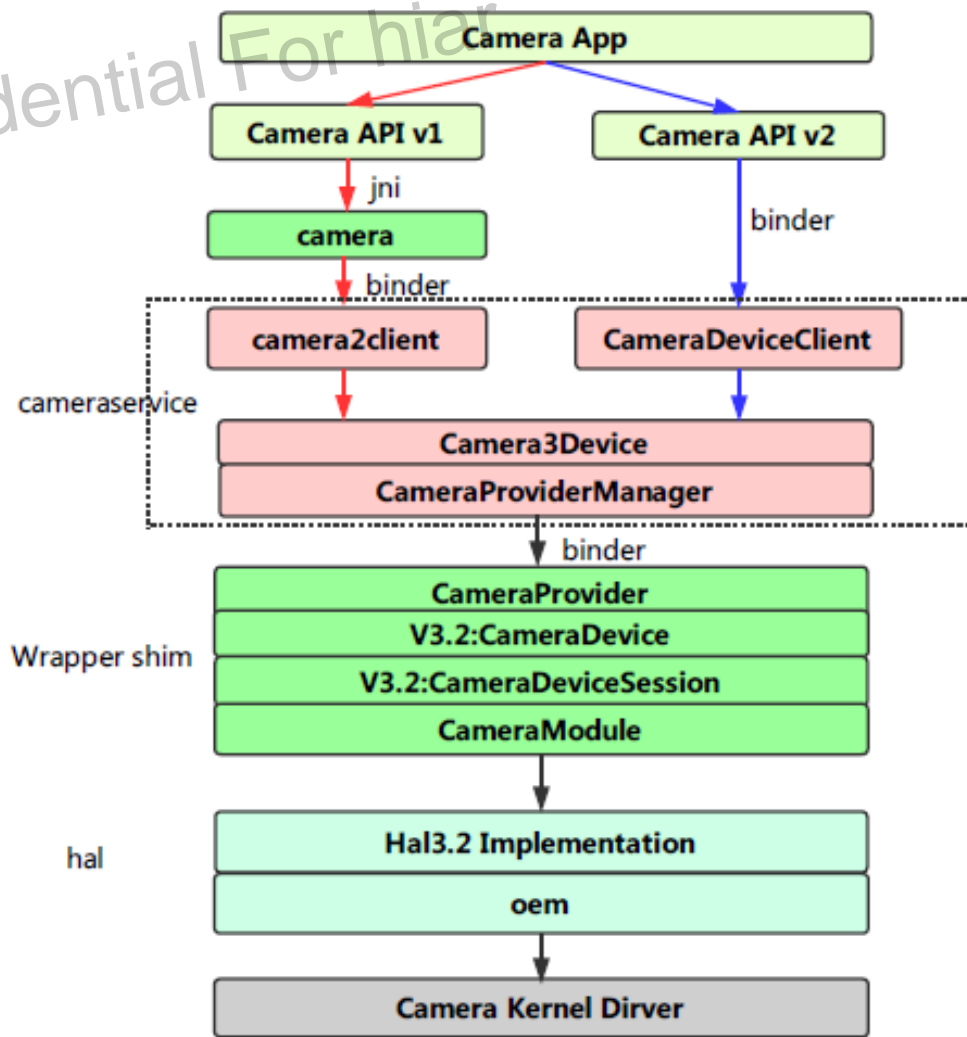
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# 01 Camera系统 架构概览





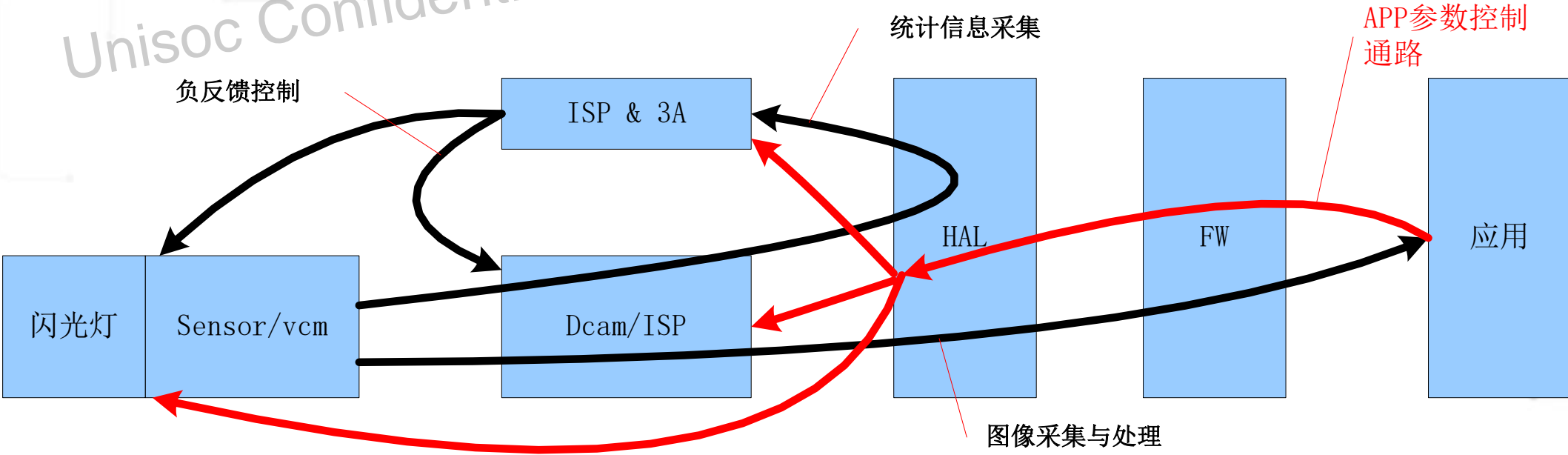
# Camera系统架构概览 1/2



camera软件架构, android8.0及之后 (HIDL)

# Camera系统架构概览 2/2

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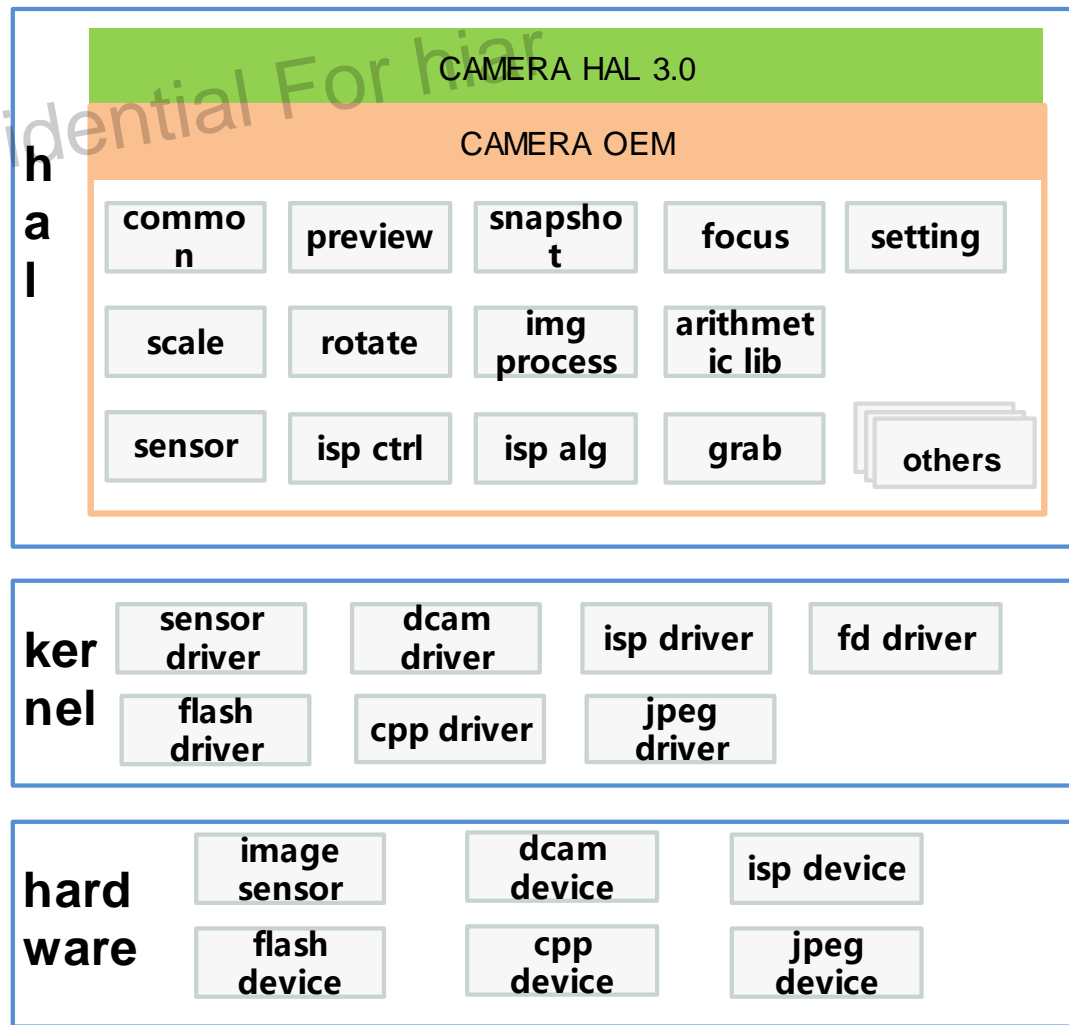
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## 02 Camera HAL & Drv 子模块介绍

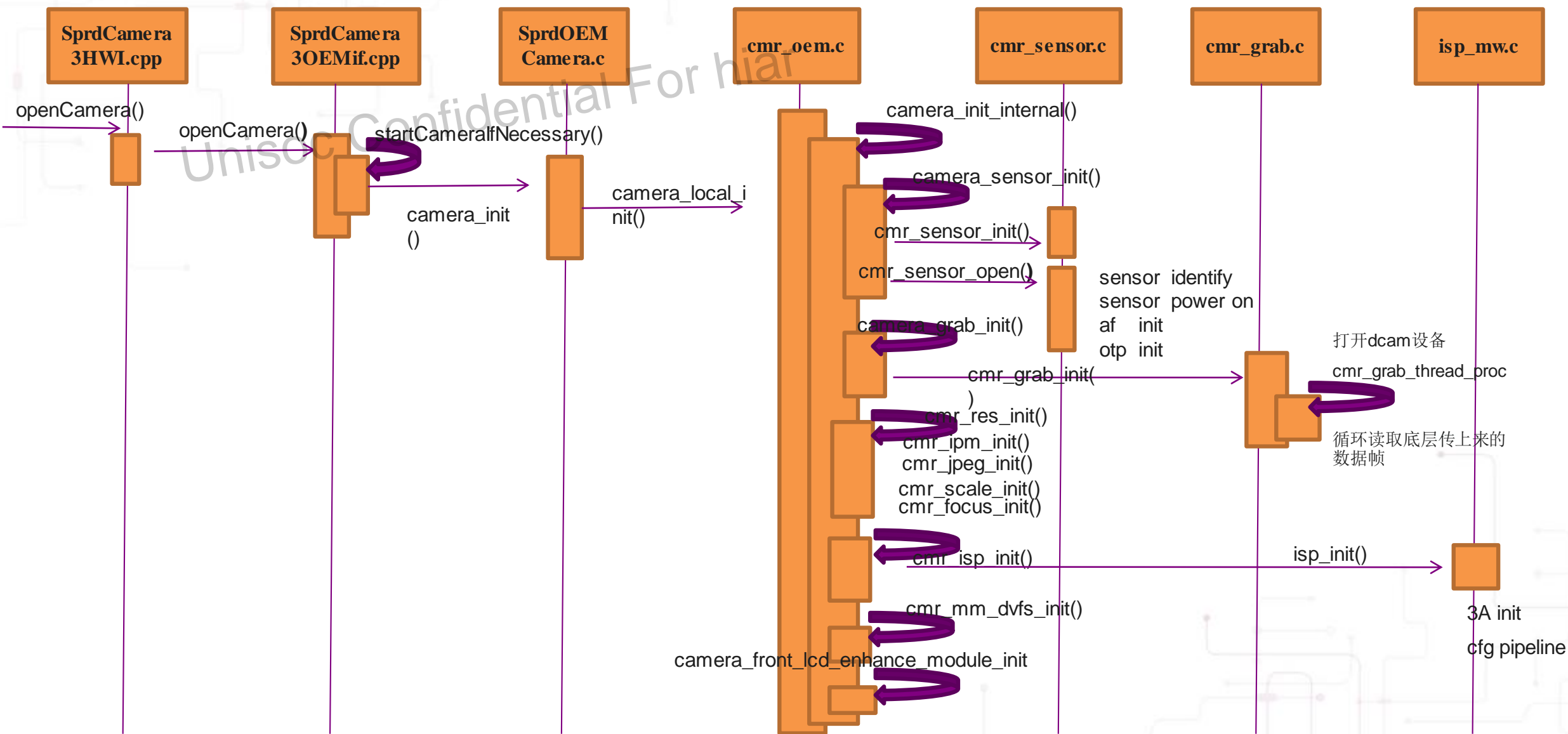




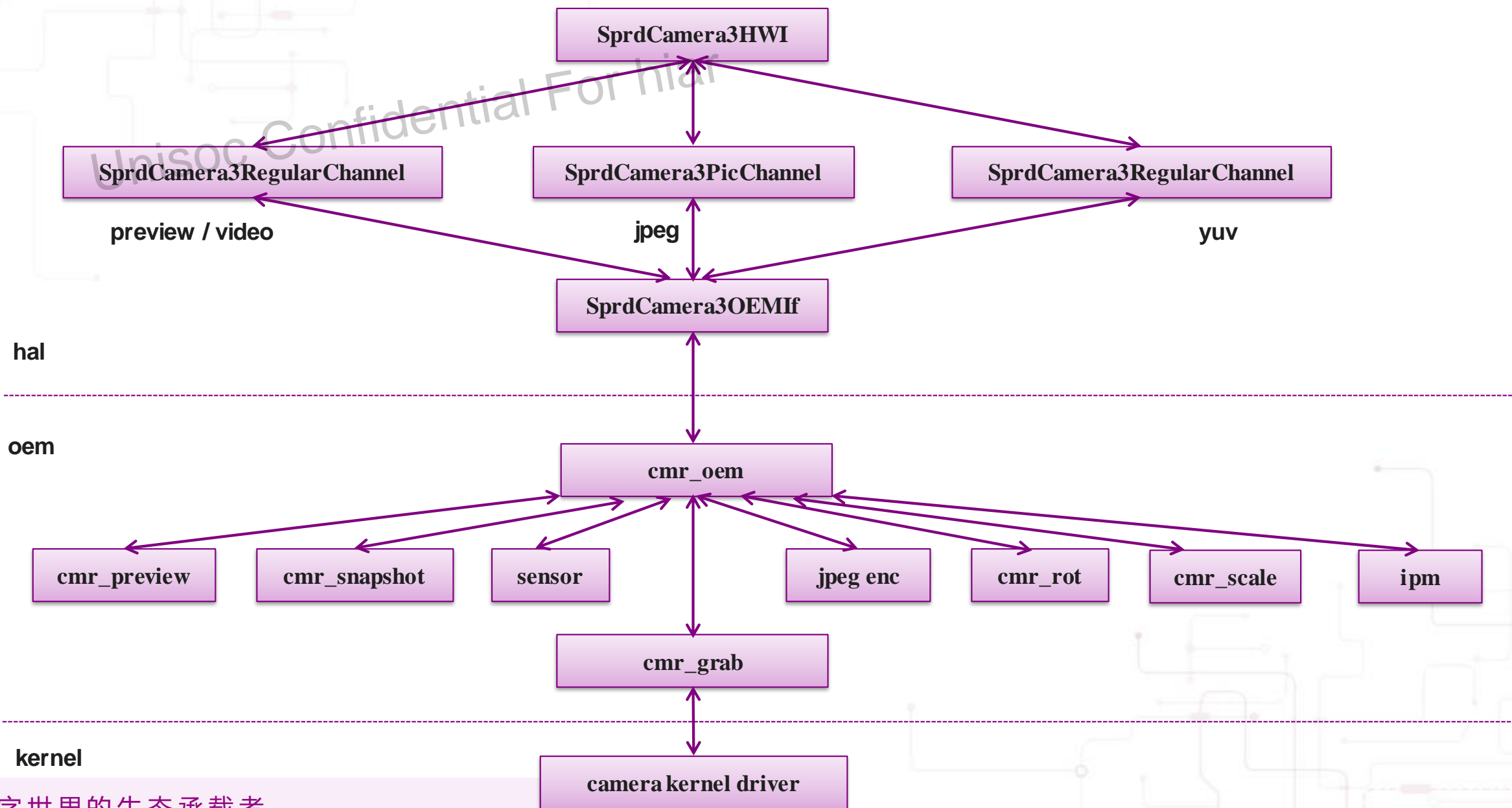
# Camera hal & driver 子模块介绍 1/3



# Camera hal & driver 子模块介绍 2/3



# Camera hal & driver 子模块介绍 3/3



# Camera hal & driver文件路径-Android 9.0

以T610为例:

User: vendor/sprd/modules/libcamera

Kernel: vendor/sprd/modules/libcamera/kernel\_module

| idx | 子模块               | 文件路径   |
|-----|-------------------|--|
| 1   | HAL               | vendor/sprd/modules/libcamera/hal3_2v6<br>vendor/sprd/modules/libcamera/common                 |
| 2   | OEM               | vendor/sprd/modules/libcamera/oem2v6   |
| 3   | 图像算法              | vendor/sprd/modules/libcamera/arithmetic   |
| 4   | ISP middle ware   | vendor/sprd/modules/libcamera/camdrv/isp2.6  |
| 5   | 3A                | vendor/sprd/modules/libcamera/ispalg/isp2.x  |
| 6   | Sensor user drv   | vendor/sprd/modules/libcamera/sensor/  |
| 7   | ISP kernel drv    | vendor/sprd/modules/libcamera/kernel_module/core/isp2.6  |
| 8   | Sensor kernel drv | /Vendor/sprd/modules/libcamera/kernel_module<br>/sensor<br>Kernel4.14/arch/arm64/boot/dts/sprd |



# Camera hal & driver文件路径-Android 10.0

User: vendor/srpd/modules/libcamera

Kernel: bsp/modules/camera

| idx | 子模块               | 文件路径   |
|-----|-------------------|--|
| 1   | HAL               | vendor/srpd/modules/libcamera/hal3_2v6<br>vendor/srpd/modules/libcamera/common |
| 2   | OEM               | vendor/srpd/modules/libcamera/oem2v6   |
| 3   | 图像算法              | vendor/srpd/modules/libcamera/arithmetic                                       |
| 4   | ISP middle ware   | vendor/srpd/modules/libcamera/camdrv/isp2.6                                    |
| 5   | 3A                | vendor/srpd/modules/libcamera/ispalg/isp3.x                                    |
| 6   | Sensor user drv   | vendor/srpd/modules/libcamera/sensor/  |
| 7   | ISP kernel drv    | bsp/modules/camera/core/isp2.6   |
| 8   | Sensor kernel drv | bsp/modules/camera/sensor<br>Kernel4.14/arch/arm64/boot/dts/sprd               |

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# Kernel编译



1. Bootimage编译和AndroidP方式一致，其中DT是包含在bootimage中，不需要单独编译
2. Camera相关KO编译
  - a. 进入bsp目录
  - b. `source ./build/envsetup.sh`
  - c. lunch 对应工程
  - d. `make modules` 编译所有的KO，包括别的模块的，也可以单独编译某一个KO，  
`make modules -m sprd_camera.ko`, 可以用`make help`查看对应的命令
3. Libcamera编译方式保持不变
4. Push文件
  - 1) bootimage保持不变，libcamera保持不变
  - 2) KO文件: `adb push bsp/out/s9863a1h10/dist/modules/ /mnt/vendor/socko/`
  - 3) 如果2)因为各种原因不能成功(如：修改KO导致不能开机等)，可使用如下方式烧录socko.img
5. 烧录socko.img命令
  - 1) `cd $(coderooot)`
  - 2) `source ./build/envsetup.sh`
  - 3) lunch
  - 4) kheader
  - 5) `make sockoimage`
  - 6) `adb reboot bootloader`
  - 7) `sudo fastboot flash socko ./out/target/product/s9863a1h10/socko.img`
  - 8) `sudo fastboot reboot`



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# Camera TAG 定义





## 1. BoardConfig.mk

device/sprd/project\_name/chip\_name/BoardConfig.mk

## 2. system.prop

device/sprd/project\_name/chip\_name/system.prop

## 3. chip\_name\_native.mk

device/sprd/project\_name/chip\_name/chip\_name\_native.mk

## 4. chip\_name\_base.mk

device/sprd/project\_name/chip\_name/chip\_name\_base.mk

### 例： SC9863A(Android 9.0)

1. device/sprd/sharkl3/s9863a\_1h10/BoardConfig.mk

2. device/sprd/sharkl3/s9863a\_1h10/system.prop

3. device/sprd/sharkl3/s9863a\_1h10/s9863a\_1h10\_native.mk

4. device/sprd/sharkl3/s9863a\_1h10/s9863a\_1h10\_base.mk

### 例： T610(Android 10.0)

1. device/sprd/sharkl5Pro/ums512\_1h10/BoardConfig.mk

2. device/sprd/sharkl5Pro/ums512\_1h10/system.prop

3. device/sprd/sharkl5Pro/ums512\_1h10/ums512\_1h10\_Natv.mk

4. device/sprd/sharkl5Pro/ums512\_1h10/ums512\_1h10\_Base.mk

| 宏名称                                    | 可选项                   | 相关选项含义        |
|--|-----------------------|---------------|
| TARGET_BOARD_SPRD_EXFRAMEWORKS_SUPPORT | true/false            | 未使用，无需配置。     |
| TARGET_BOARD_CAMERA_HAL_VERSION        | 1.0/2.0/3.0           | 选择hal版本，不能更改。 |
| TARGET_BOARD_CAMERA_ISP_64BIT          | true/false            | 未使用，无需配置。     |
| TARGET_BOARD_CAMERA_ISP_VERSION        | 2.1/2.2/2.3/2.4/2.5/3 | 选择isp版本，不能更改。 |
| TARGET_BOARD_IS_SC_FPGA                | true/false            | 未使用，无需配置。     |
| TARGET_BOARD_CAMERA_OFFLINE            | true/false            | 特殊设置，不能更改。    |

| 宏名称                                    | 可选项                     | 相关选项含义   |
|--|-------------------------|--|
| TARGET_BOARD_CAMERA_AUTO_DETECT_SENSOR | true/false              | Ture:最大拍照size等于sensor driver中配置<br>False:最大拍照size使用CAMERA_SUPPORT_SIZE |
| CAMERA_SUPPORT_SIZE                    | 2M,3M,5M,8M,13M,16M,21M | 主摄支持的最大拍照size,<br>TARGET_BOARD_CAMERA_AUTO_DETECT_SENSOR为ture时无效       |
| FRONT_CAMERA_SUPPORT_SIZE              | 2M,3M,5M,8M,13M,16M,21M | 前摄支持的最大拍照size  |
| BACK_EXT_CAMERA_SUPPORT_SIZE           | 2M,3M,5M,8M,13M,16M,21M | 后辅摄支持的最大拍照size   |
| CAMERA_SENSOR_TYPE_BACK                | 如"ov13855,imx258"       | 后主摄像头支持列表  |
| CAMERA_SENSOR_TYPE_FRONT               | 如"ov5675"               | 前主摄像头支持列表  |
| CAMERA_SENSOR_TYPE_BACK_EXT            | 如"ov5675"               | 后辅摄像头支持列表  |

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CTS/ITS





# CTS-Newly Add Test Cases – Android 10.0 1/2

| No. | CTS Class                         | CTS Name                                     |
|-----|-----------------------------------|--|
| 1   | HeifWriterTest                    | testHeif                                     |
| 2   | BurstCaptureTest                  | testJpegBurst                                |
| 3   | CameraManagerTest                 | testCameraManagerWithDnD                     |
| 4   | CameraManagerTest                 | testNoLegacyOnQ                              |
| 5   | CaptureRequestTest                | testFlashTurnOff                             |
| 6   | ExtendedCameraCharacteristicsTest | testCameraOrientationAlignedWithDevice       |
| 7   | ExtendedCameraCharacteristicsTest | testLegacyCameraDeviceParity                 |
| 8   | ExtendedCameraCharacteristicsTest | testRecommendedStreamConfigurations          |
| 9   | ImageReaderTest                   | testDynamicDepth                             |
| 10  | ImageReaderTest                   | testHeic                                     |
| 11  | ImageReaderTest                   | testImageReaderPrivateWithProtectedUsageFlag |
| 12  | ImageReaderTest                   | testImageReaderYuvAndRawWithUsageFlag        |
| 13  | ImageReaderTest                   | testRepeatingHeic                            |
| 14  | ImageReaderTest                   | testUsageRespected                           |
| 15  | ImageReaderTest                   | testY8                                       |
| 16  | ImageReaderTest                   | testYuvAndJpegWithUsageFlag                  |
| 17  | ImageWriterTest                   | testYuvImageWriterReaderOperationAlt         |
| 18  | LogicalCameraDeviceTest           | testActivePhysicalId                         |

# CTS-Newly Add Test Cases - Android10.0 2/2

| No. | CTS Class                   | CTS Name                                 |
|-----|-----------------------------|--|
| 1   | LogicalCameraDeviceTest     | testDefaultFov                           |
| 2   | LogicalCameraDeviceTest     | testLogicalCameraZoomSwitch              |
| 3   | MultiViewTest               | testTextureImageWriterReaderOperation    |
| 4   | NativeCameraDeviceTest      | testCameraDeviceCaptureFailure           |
| 5   | NativeCameraDeviceTest      | testCameraDeviceLogicalPhysicalStreaming |
| 6   | NativeCameraDeviceTest      | testCameraDeviceLogicalPhysicalSettings  |
| 7   | NativeImageReaderTest       | testDepthJpeg                            |
| 8   | NativeImageReaderTest       | testHeic                                 |
| 9   | NativeImageReaderTest       | testStillCapture                         |
| 10  | RecordingTest               | testIntermediateSurfaceRecording         |
| 11  | ReprocessCaptureTest        | testBasicYuvToHeicReprocessing           |
| 12  | ReprocessCaptureTest        | testBasicOpaqueToHeicReprocessing        |
| 13  | RobustnessTest              | testAeAndAfCausality                     |
| 14  | SimpleObjectsTest           | CameraKeysTest                           |
| 15  | StillCaptureTest            | testHeicExif                             |
| 16  | LegacyCameraPerformanceTest | testLegacyApiPerformance                 |
| 17  | CameraEvictionTest          | testCamera2AccessCallback                |

# ITS Difference

| No. | Scene   | ITS Case                    | Android_P   | Android_10  |
|-----|---------|-----------------------------|-------------|-------------|
|     |         |                             | Mandatory?  | Mandatory?  |
| 1   | Scene 0 | test_camera_properties      | Mandatory   | Not present |
| 2   | Scene 0 | test_test_patterns          | Optional    | Optional    |
| 3   | Scene 0 | test_tonemap_curve          | Not present | Optional    |
| 4   | Scene 1 | test_ae_precapture_trigger  | Optional    | Optional    |
| 5   | Scene 1 | test_channel_saturation     | Not present | Optional    |
| 6   | Scene 2 | test_auto_per_frame_control | Not present | Optional    |
| 7   | Scene 2 | test_effects                | Not present | Mandatory   |

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# 谢谢



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