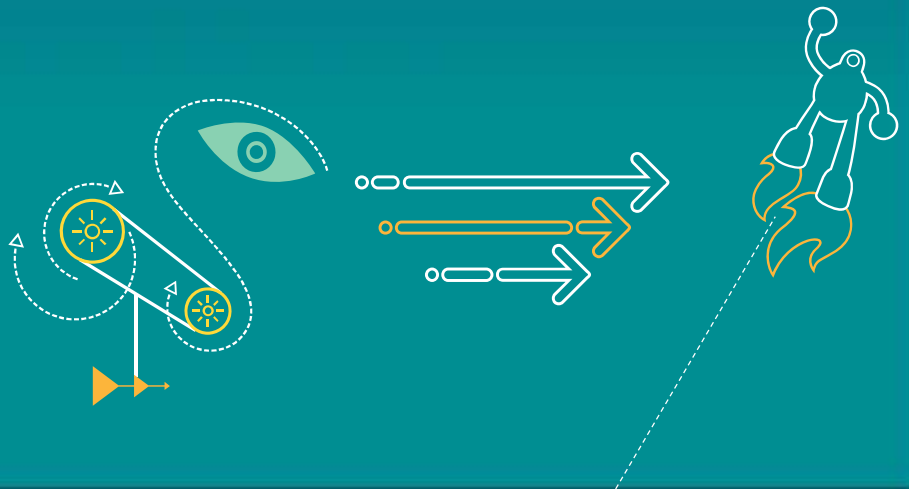
高通用户体验性能优化期刊

Qualcomm Technologies, Inc.



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Revision History

Revision	Date	Description
A	Mar 2016	Initial release

Note: There is no Rev. I, O, Q, S, X, or Z per Mil. standards.

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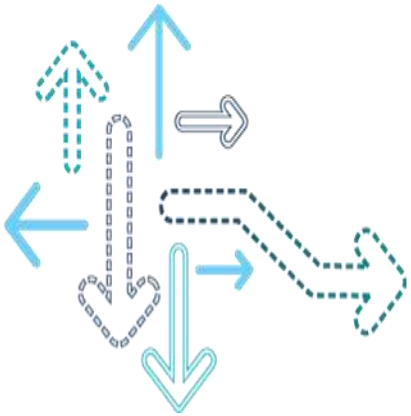
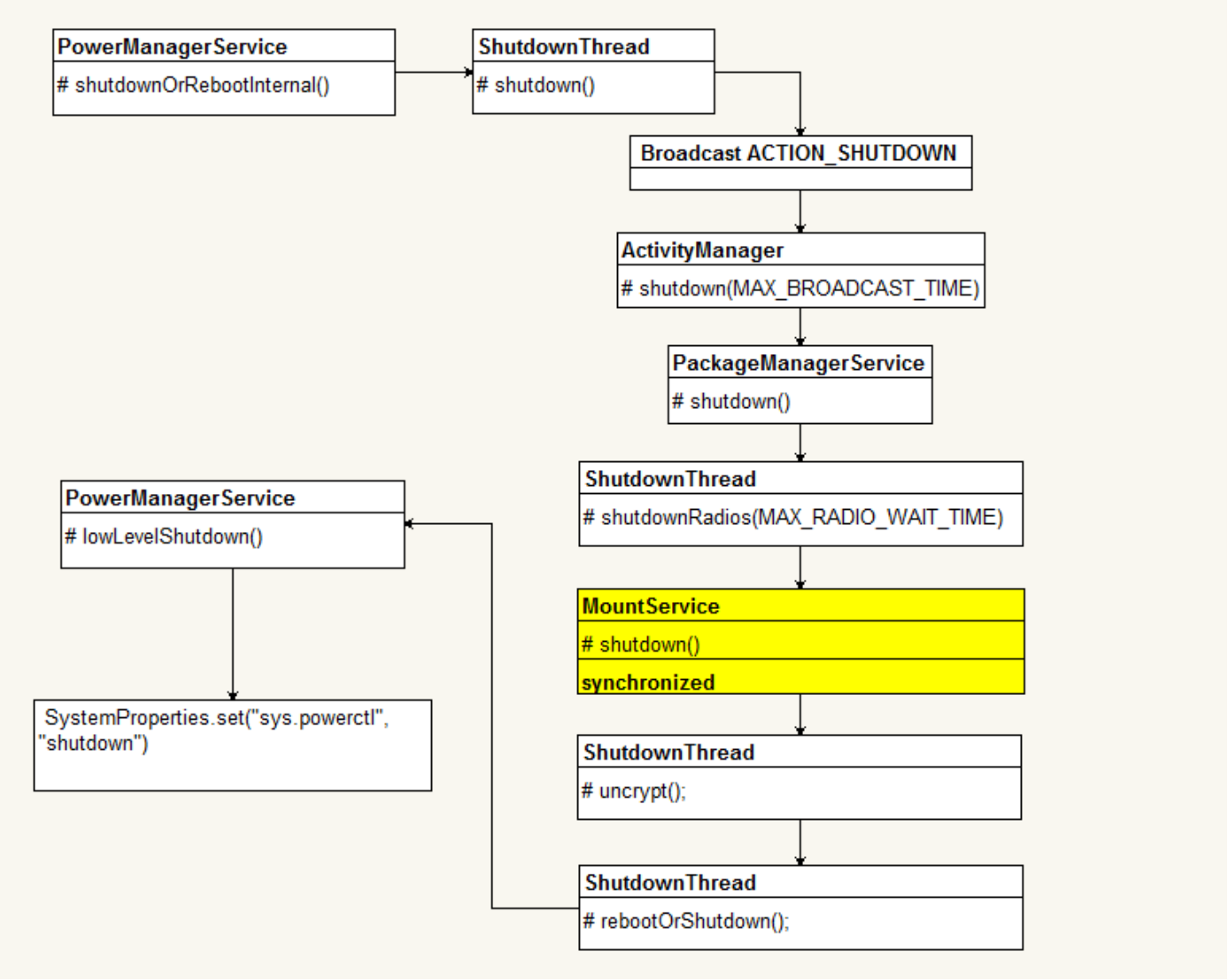


Android关机慢问题分析

PowerManagerService关机流程



Android关机慢问题分析

常见问题

MountService 超时导致关机时间长

由于打开的应用较多，应用程序持有文件句柄，导致MountService在shutdownThread关机过程中超时。

25827: 01-10 02:33:01.992 1521 4255 I ShutdownThread: Shutting down MountService
34865: 01-10 02:33:21.993 1521 4255 W ShutdownThread: Shutdown wait timed out

可以使用lsof 来查看有哪些应用打开了分区上的文件而没有释放

```
5529: com.andro  2531     u0_a10   18       ???                ???       ???     ??? /storage/emulated/0/launcher.log
5549: com.andro  2531     u0_a10   28       ???                ???       ???     ??? /storage/emulated/0/.sarrs_desktop/journal
5579: com.andro  2531     u0_a10   43       ???                ???       ???     ??? /storage/emulated/0/.sarrs_desktop/journal
5937: com.andro  2714     u0_a78   16       ???                ???       ???     ??? /storage/emulated/0/Android/data/com.android.music/cache/uil-images/journal
6853: com.andro  3618     u0_a62   17       ???                ???       ???     ??? /storage/emulated/0/Android/data/com.letv.android.note/cache/uil-images/journal
7767: com.andro  4083    u0_a108   16       ???                ???       ???     ??? /storage/emulated/0/superlive/.image/journal
7807: com.andro  4105      u0_a1   17       ???                ???       ???     ??? /storage/emulated/0/feedback.log
7817: com.andro  4105      u0_a1   23       ???                ???       ???     ??? /storage/emulated/0/recentLogs/2015_12_11-16_50_system_app_anr_log.zip
7819: com.andro  4105      u0_a1   24       ???                ???       ???     ??? /storage/emulated/0/recentLogs/2015_12_11-16_50_system_app_anr_log.zip
7821: com.andro  4105      u0_a1   25       ???                ???       ???     ??? /storage/emulated/0/recentLogs/2015_12_11-16_50_system_app_anr_log.zip
8071: com.andro  4284     u0_a40   27       ???                ???       ???     ??? /storage/emulated/0/Android/data/com.android.deskclock/cache/uil-images/journal
```

Android关机慢问题分析

Solution1

应用监听**android.intent.action.REBOOT“ 和 ”android.intent.action.ACTION_SHUTDOWN，在收到此类消息时将所持文件句柄释放。**

Solution 2

针对第三方应用程序，可以调整ForceUnmount的sleep时间

代码路径 system/vold/Utils.cpp

Note： 由于此接口在doUmount()中并不检查返回值，因此并不存在返回失败的场景的处理。

Android设备唤醒时间分析

Android设备唤醒时间

拆分为两大部分

Kernel space的唤醒时间分析

从按下电源键(power)键，到中断qpnp_kpdpwr_status响应的时间

User space的唤醒时间分析

从中断qpnp_kpdpwr_status响应到第SurfaceFlinger第一帧绘制的时间

qpnp-power-on.c ：

qpnp_kpdpwr_irq

Kernel space的唤醒时间分析

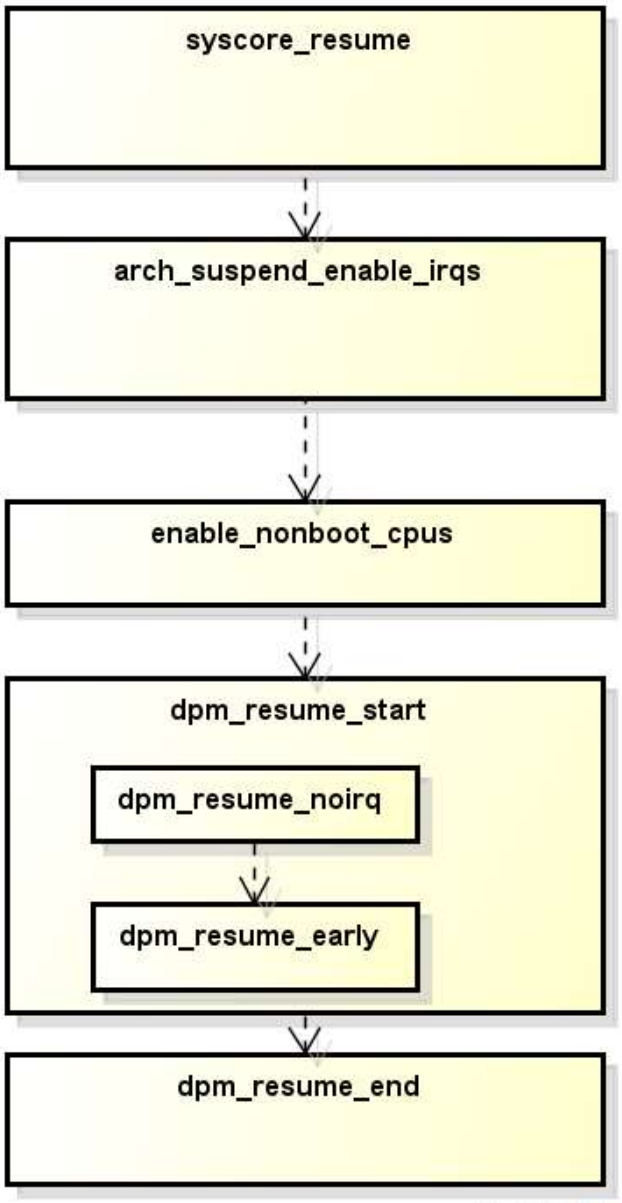
开启对应debug代码:

kernel config: CONFIG_PM_SLEEP_DEBUG=y

device\qcom\msmxxx\BoardConfig.mk:

BOARD_KERNEL_CMDLINE += initcall_debug log_buf_len=16M

Kernel Space唤醒流程



- 对应的kernel log:
- dpm_resume_noirq完成

  [141.782368] PM: noirq resume of devices complete after 37.011 msecs
- dpm_resume_early完成

  [141.794448] PM: early resume of devices complete after 7.862 msecs
- dpm_resume_end

  [141.906757] PM: resume of devices complete after 112.295 msecs

时间分析

Kernel 中device的唤醒，打印如下格式 :

call **device_xxx** returned 0 after **time_yyyy** usecs inf=**zzz_type**

device_xxx: 设备的名字
time_yyy:　唤醒花费的时间，单位微妙
zzz_type:　唤醒设备的类型及唤醒阶段，

如果某个唤醒阶段花费的时间较多，那么可以查找下表，分析对应的实现函数

info字段	实现函数
noirq power domain	pm_domain->ops->resume_noirq
noirq class	class->pm->resume_noirq
noirq bus	bus->pm->resume_noirq
noirq driver	driver->pm->resume_noirq
early class	class->pm->resume_early
early bus	bus->pm->resume_early
early driver	driver->pm->resume_early
early class	class->resume
early bus	bus->pm->resume
early driver	driver->pm->resume

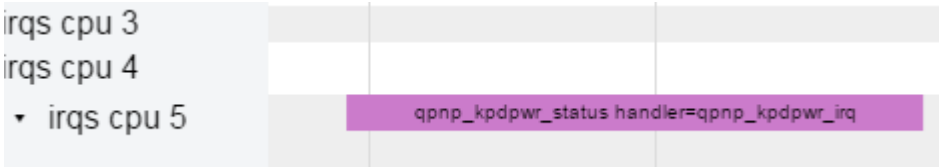
User Space的唤醒时间分析

抓取Systrace与参考设备进行对比

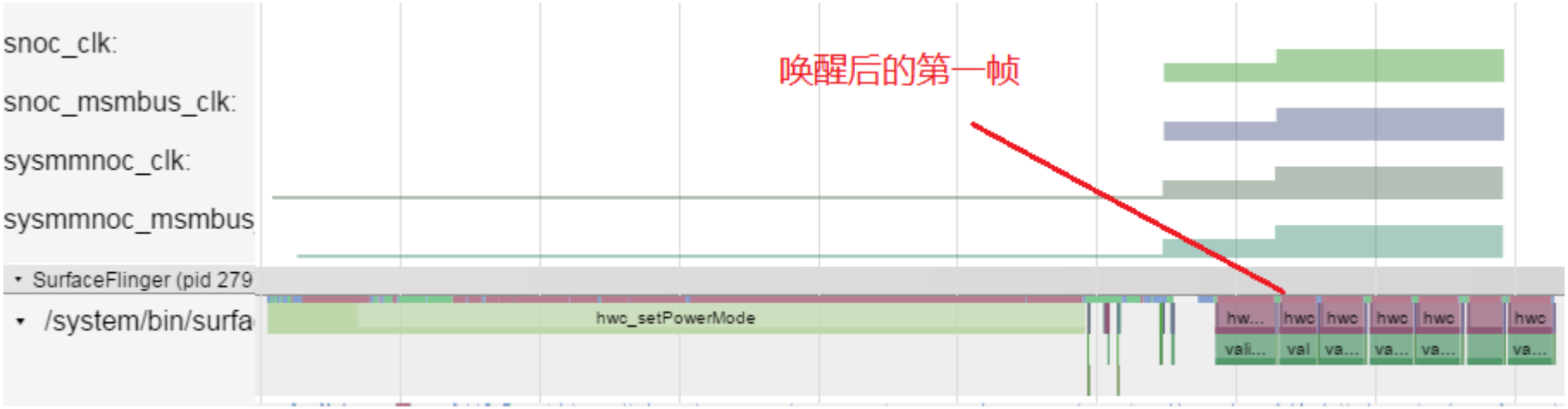
1)连接usb线，按下power键，关闭屏幕，等1分钟

2)开始抓systrace，稍等2s后，按下power键，点亮屏幕

起始点：触发Power键中断，中断函数名字(adb shell cat /proc/interrupts |grep kpdpwr)



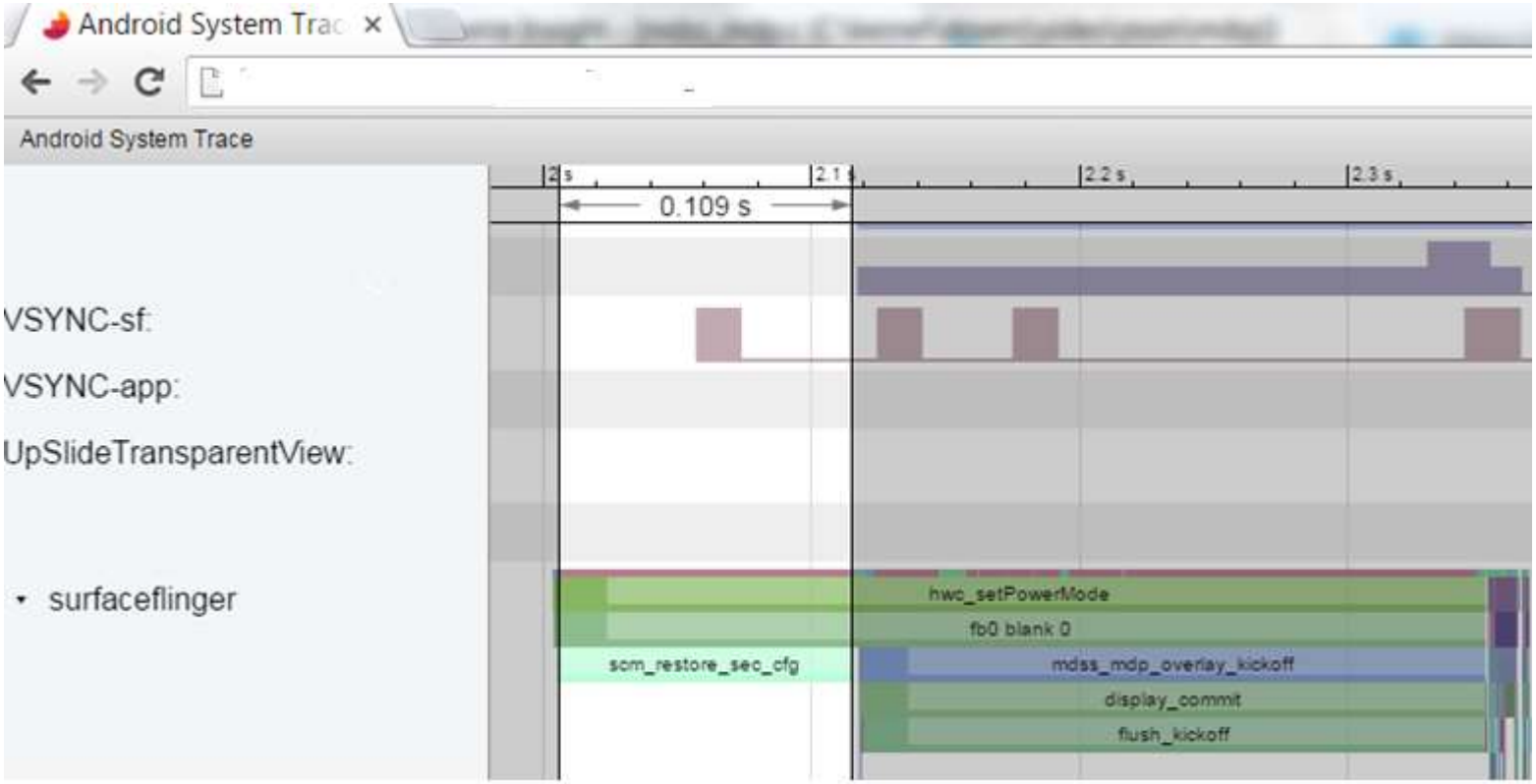
结束点：



典型案例:指纹唤醒慢

对比power键唤醒，发现指纹唤醒时间变长：

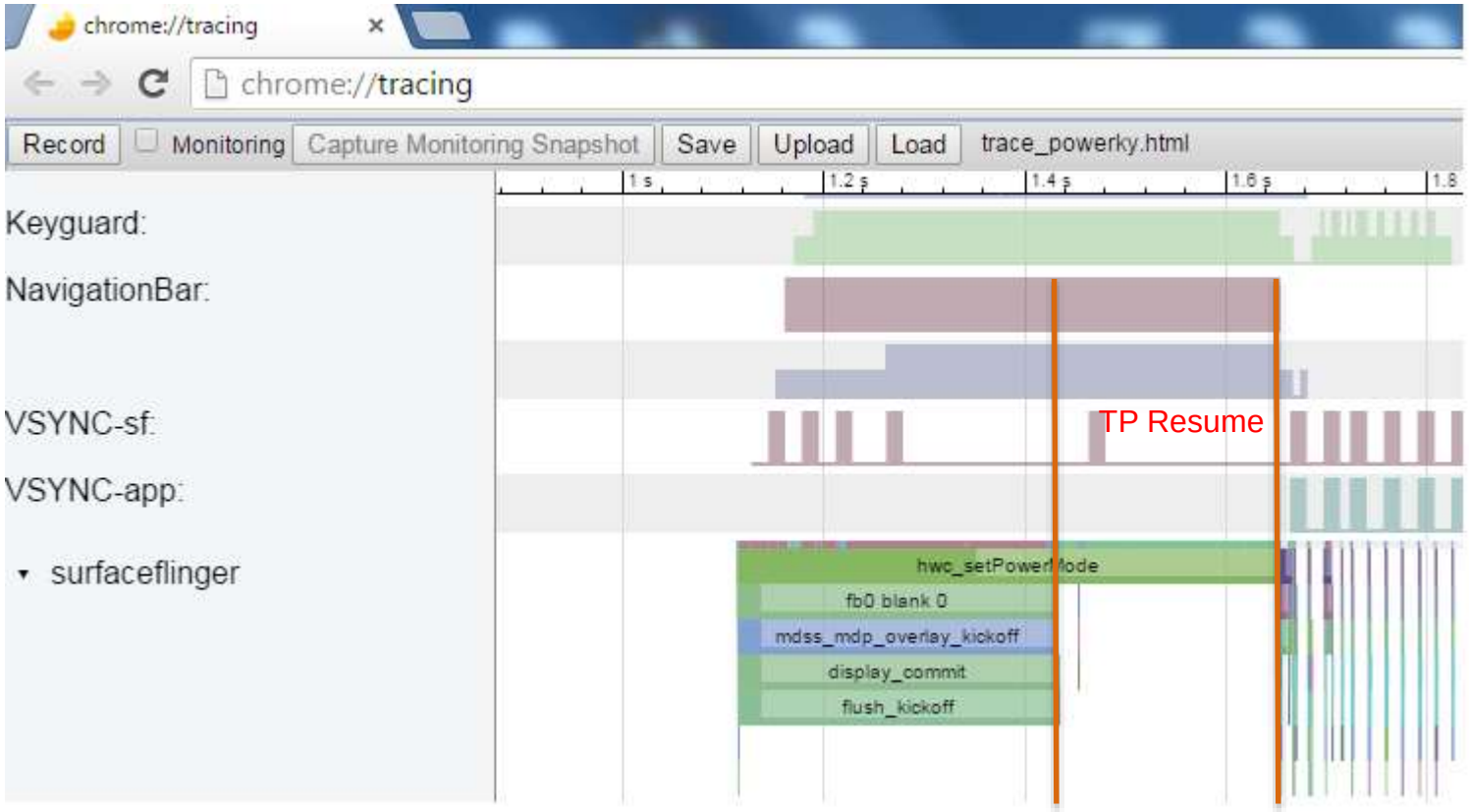
进一步定位发现lcd唤醒与指纹唤醒会竞争信号量



解决方案：解决资源冲突，优先唤醒屏幕

典型案例:TP resume 慢

对比power键唤醒，发现TP resume 慢,典型的systrace log 如下.



典型案例:TP resume 慢

解决方案:
用优化TP driver 用workqueue 来实现TP 的resume. 请参考下面的实现.

https://codeaurora.org/cgit/quic/la/kernel/msm-3.10/commit/?h=LA.BR.1.3.2&id=dd6e2392f921e3b3368a3e5d4f2885258a48d323

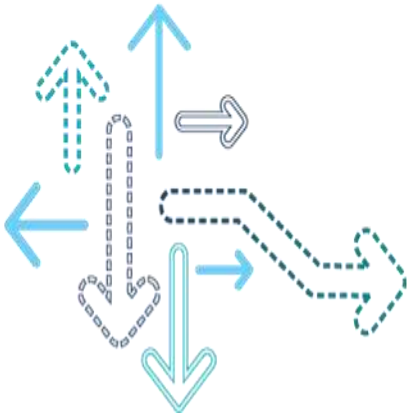
https://codeaurora.org/cgit/quic/la/kernel/msm-3.10/commit/?h=LA.BR.1.3.2&id=e291ac12f2e1ce2c0cb269b0b441d74c65a936c6

ANDROID-25773204/CVE-2016-0805

ANDROID-25773204/CVE-2016-0805

如果需要这个patch,请参考下面的link.

https://www.codeaurora.org/cgit/quic/la/kernel/msm-3.10/commit/?h=msm-3.10&id=aca0f3abeca78c943a879b23c9445deac5fc9cd3



Questions?

https://support.cdmatech.com