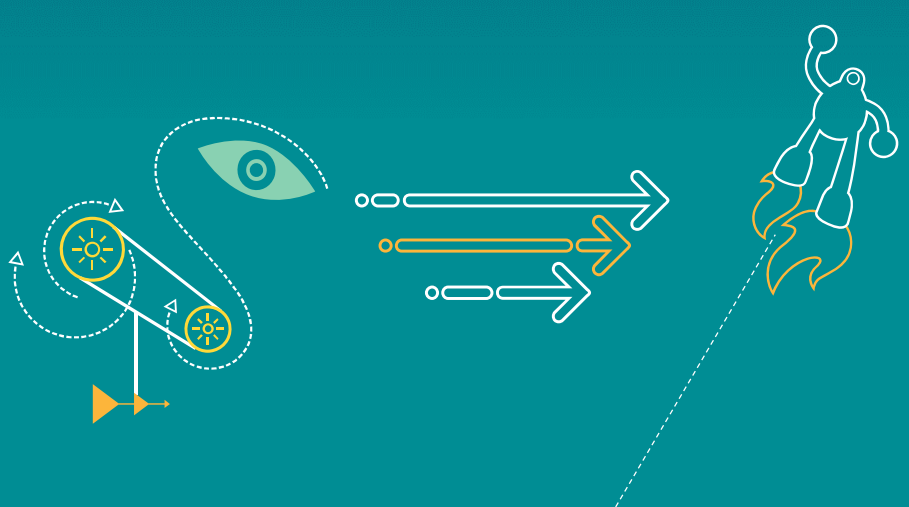
Android Multimedia Power Debugging Guidelines

Qualcomm Technologies, Inc.



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Revision History

Revision	Date	Description
A	Oct 2014	Initial release
B	Oct 2014	Updated title, added Camera Use Case section and added reference 80-N4717-1, Snapdragon Performance Visualizer 9.0 User Guide
C	Dec 2014	Added MSM Bus Voting slide and Filing a Power Case slide; updated Tuning Parameters and MP3 Playback Use Case slides

Contents

- Power Tools
- Debugging Approach
- Tuning Parameters
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- References
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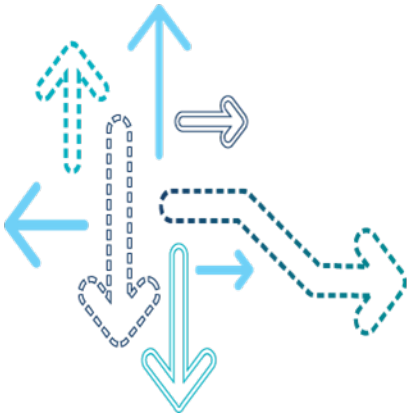
Power Tools



Environment Setup to Debug

Tools	Precondition	Install	Location
PowerTop	adb root adb shell mount -t debugfs none /sys/kernel/debug	adb shell su –c setenforce 0 adb push <powertop location>\powertop /data/ adb shell chmod 777 /data/powertop	In the source file
Top	NA	Does not require installation	Linux default
Perf top	adb root adb shell mount -t debugfs none /sys/kernel/debug	adb shell su –c setenforce 0 adb push <perf location>\perf /data/ adb shell chmod 777 /data/perf	From POC
Pytime chart	Pythonxy tool Ensure ETS and pythonxy are selected for installation	https://code.google.com/p/pythonxy/wiki/Downloads Once installed, open a command prompt in C:\ and run easy_install pytimechart	https://code.google.com/p/pythonxy/wiki/Downloads
Systrace	SDK tool	http://developer.android.com/tools/sdk/tools-notes.html	Android SDK toolkit
Clock dump	adb root adb shell mount -t debugfs none /sys/kernel/debug	Adb command – Does not require installation Systrace – Refer to systrace row Trace 32 – Install Trace 32	
SPV	Install Cygwin, version 1.7.15 is recommended	Go to folder SPVInstallPackage Only have to run *.bat files	Download document HK11-N8928-1

Tools and Logging Methodologies for Debugging

Tools	Output	When to use	How to use
Power Top	Cmd line output shows CPU residency information for each frequency and interrupt information	To verify CPU residency for each frequency and interrupt	adb shell /data/powertop –t (time)
Top	Cmd line text output shows CPU load for each process or thread	To identify the CPU load for each process or thread	adb shell top adb shell top –t
Perf top	Text output shows the instructions per second of the specific process or thread	To identify the usage of specific process or thread	adb shell perf top –p pid adb shell perf top –t tid
Pytime chart	Pytime Chart shows the kernel function calls and interrupt information	To identify the cause of the interrupts	Open a command prompt in C:\ and run –pytimechart
systrace	Systrace shows clock information of each clock (CPU, GPU, etc), SurfaceFlinger, eventcontrol, work queue, etc	To identify the frequency of each clock, frame drop, execution time of each function, thread migration, init clock, etc.	sdk/tools/monitor
msmbusvoting	Text output shows active clock frequency for each clock	To identify current clock frequency for each use case	msmbusvoting.exe --option
NPA Dump	Text output showing subsystem bandwidth request	Useful in identifying subsystems voting for high bandwidth	Trace 32

Tools and Logging Methodologies for Debugging (cont.)

Tools	Output	When to use	How to use
Clock residency	Text output shows some active clock residency data	To identify residency data for CPU/GPU and BIMC	Frequency_distribution.exe
Wave form	Graphic output shows wave of current consumption for each use case	To measure the current consumption and analyze the pattern or base current	Use the power measurement tool
SPV	Graphic output shows CPU/GPU-related information as clock frequency, state, utilization and interrupt, thermal, memory usage, etc.	To visualize, analyze, and correlate the impact of detailed CPU and system data on application performance	Download document *Snapdragon Performance Visualizer 9.0 User Guide* 80-N4717-1

ADB Commands for Debugging

ADB command	Output	When to use	How to use
SurfaceFlinger	Text output shows each layer-related information as size, rectangle, used pipe, allocated buffer, layer count, display panel type, etc.	To identify layer count, used pipe, updated rectangle per each layer	adb shell dumpsys SurfaceFlinger
LPM stats	Provides time statistics of each CPU Core/Cluster/L2 Cache spent in each low power mode such as WFI, standalone-PC, Idle PC	Useful for CPU side debugging; helpful to check expected low power states during use cases such as mp3, static display use cases	adb shell cd /d/lpm_stats cat stats > /data/lpmstats_before && sleep 40 && cat stats > /data/lpmstats_after
Dumpsys power	Output will show Suspend Blockers wakelock	Useful for debugging power issues that uses third-party application; helpful to debug mp3 playback power issue if third-party application is being used	adb shell dumpsys power
Wakeup_source	Check for wakelock which is under active_since	Useful for debugging power issues that uses third-party application; helpful to debug mp3 playback power issue if third-party application is being used	adb shell cat sys/kernel/debug/wakeup_sources

ADB Commands for Debugging (cont.)

ADB command	Output	When to use	How to use
Clock Dump	Text output showing active clock frequencies	Useful in identifying subsystems running at higher frequencies causing higher current	adb command
MSM Bus Requests	Text output shows bus voting value as ab/ib and caller/callee	To identify voting value and caller/callee by master and slave id	adb shell cat /d/msm-bus-dbg/client-data/(subsystem name)
kmsg	Text output shows kernel logs	To identify MP Decision, migration, MDSSP, SurfaceFlinger, etc.	adb shell cat /proc/kmsg | grep “keyword”

Top

- Process Id, Thread Id, Priority, CPU Load, Process status (D: Uninterruptible sleep, R: Running, S: Sleeping, Z: Zombie), Virtual memory, Real memory, Policy, User Id, Thread and Process name

Purpose	To identify CPU load per process and thread
Pros	Easy to use
Cons	No other information excluding CPU load for each process and thread
Usage	sleep 5 && while true; do echo \=\=\=\=\=\=\=\=\=\=; cat /proc/uptime; top -m 25 -d 1 -n 1 -t; done > /data/dumptop.txt &

Top (cont.)

```
User 2%, System 18%, IOW 0%, IRQ 0%
User 9 + Nice 0 + Sys 79 + Idle 326 + IOW 4 + IRQ 1 + SIRQ 1 = 420

  PID   TID PR CPU% S     VSS     RSS PCY UID      Thread          Proc
 2084  2084  0   8% D       0K      0K     root     irq/341-synapti
15126 15126  1   5% R    1736K    980K     root     top             top
 1384  1402  0   1% S    6612K    872K     root     mpdecision      /system/bin/mpdecision
  865   974  0   1% S 579796K  55336K  fg system   UEventObserver  system_server
  865   960  0   0% S 579796K  55336K  fg system   ActivityManager system_server
  140   140  0   0% S       0K      0K     root     kworker/0:3
 1029  1029  0   0% S 491776K  48880K  fg u0_a60   ndroid.systemui com.android.systemui
    3     3  0   0% S       0K      0K     root     ksoftirqd/0
  395   677  0   0% S   69824K  10620K  fg system   EventThread
/system/bin/surfaceflinger
 2195  2195  0   0% S       0K      0K     root     kworker/0:0
```

2% from user apps and 18% from system apps; total CPU usage is 20%

The time spent in each service, 3260 ms for idle service, 790 ms for system service, 90 ms for user service, 40 ms for IOW(I/O wait), 10 ms for IRQ(hardware Interrupt Requests), 10 ms for SIRQ(software Interrupt Requests)

```
User 0%, System 24%, IOW 0%, IRQ 1%
User 0 + Nice 0 + Sys 83 + Idle 250 + IOW 0 + IRQ 5 + SIRQ 0 = 338

  PID   TID PR CPU% S     VSS     RSS PCY UID      Thread          Proc
 2084  2084  0  22% D       0K      0K     root     irq/341-synapti
15126 15126  0   6% R    1744K    992K     root     top             top
 1384  1402  0   3% S    6612K    872K     root     mpdecision      /system/bin/mpdecision
    3     3  0   0% S       0K      0K     root     ksoftirqd/0
  140   140  0   0% S       0K      0K     root     kworker/0:3
   19    19  0   0% S       0K      0K     root     kworker/0:1H
  126   126  0   0% S       0K      0K     root     mmcqd/0
  865   974  0   0% S 579796K  55336K  fg system   UEventObserver  system_server
15094 15094  0   0% S       0K      0K     root     kworker/u:2
  413   413  0   0% S    1180K    624K     system   qrngd           /system/bin/qrngd
```

PowerTop

- Provides information on CPU residency, low power state, and interrupts and timer

Purpose	To identify CPU residency, low power state, and interrupts
Pros	Easy to see the residency of interrupt and timer
Cons	No information about the interrupt source
Usage	sleep 5 && while true; do echo \=\=\=\=\=\=\=\=\=\=\=\=\=; /data/powertop -r -d -t 30; done > data/dumptop.txt &

- Low Power state

C-State	Name	Description
C0	Clock Gating or Wait For Interrupt (WFI)	CPU fully turned on Processor to sleep until an interrupt occurs.
C1	Retention	Stops CPU main internal clocks via software (Clock gating at lower voltage)
C2	Standalone Power Collapse (SPC)	Stops CPU main internal clocks via hardware
C3	Power Collapse (PC)	Stops all CPU internal clocks

PowerTop (cont.)

```
Cn                Avg residency
C0 (cpu running)          (31.0%)   (34.9%)      (100.0%)     (100.0%)
C0          0.1ms ( 0.0%)   0.1ms ( 0.0%)   0.0ms ( 0.0%)   0.0ms ( 0.0%)
C1          0.3ms ( 0.9%)   0.4ms ( 0.4%)   0.0ms ( 0.0%)   0.0ms ( 0.0%)
C2          0.6ms ( 0.5%)   0.9ms ( 0.4%)   0.0ms ( 0.0%)   0.0ms ( 0.0%)
C3          2.7ms (67.6%)   3.3ms (64.3%)   0.0ms ( 0.0%)   0.0ms ( 0.0%)
P-states (frequencies)
    300 Mhz     33.4%   36.8%    0.0%    0.0%
    422 Mhz      4.4%    5.6%    0.0%    0.0%
    653 Mhz      4.0%    6.4%    0.0%    0.0%
    730 Mhz      1.6%    1.8%    0.0%    0.0%
    883 Mhz      1.2%    0.8%    0.0%    0.0%
    960 Mhz      7.0%    7.4%    0.0%    0.0%
   1037 Mhz      1.4%    0.0%    0.0%    0.0%
   1190 Mhz      2.8%    2.2%    0.0%    0.0%
   1267 Mhz      0.8%    0.4%    0.0%    0.0%
   1498 Mhz     30.8%   37.2%    0.0%    0.0%
   1.58 Ghz      0.0%    0.0%    0.0%    0.0%
   1.73 Ghz      0.0%    0.4%    0.0%    0.0%
   1.96 Ghz      0.0%    0.4%    0.0%    0.0%
   2.27 Ghz      0.4%    0.8%    0.0%    0.0%
   2.46 Ghz     12.3%    0.0%    0.0%    0.0%

MSM PM idle stats:
idle-wfi (count = 153) : 0.133975476s
idle-power-collapse (count = 888) : 2.993514408s
idle-failed-power-collapse (count = 106) : 0.42916095s
suspend (count = 0) : 0.0s
idle-power-collapse (count = 862) : 3.100373579s
idle-failed-power-collapse (count = 125) : 0.47944420s
suspend (count = 0) : 0.0s
suspend (count = 0) : 0.0s

Wakeups-from-idle per second : 378.2    interval: 5.0s

Power usage (ACPI estimate): 76019032327757.1W (0.0 hours)
```

Running state

PM Idle stats

```
Top causes for wakeups:
  43.3% (327.2)       <interrupt> : arch_timer
  18.2% (138.0)       <interrupt> : qcom,smd-rpm
  14.4% (108.6)       <interrupt> : arch_mem_timer
  10.4% ( 78.4)       <interrupt> : MDSS
   4.4% ( 33.4)       <interrupt> : qup_err_intr
   3.7% ( 28.0)       <interrupt> : kgsl-3d0
   1.7% ( 13.0)       <interrupt> : cpubw_hwmon
   1.5% ( 11.6)       <interrupt> : fts_touch
   1.5% ( 11.6)       <interrupt> : msmgpio
   0.9% (  6.6)       <interrupt> : mmc0

Timer breakdown (dg_timer or gp_timer):
  17.1% ( 51.0)         swapper/0 : hrtimer_start_range_ns (tick_sched_timer)
  15.6% ( 46.4)         swapper/1 : hrtimer_start_range_ns (tick_sched_timer)
  11.9% ( 35.6)          DispSync : hrtimer_start_range_ns (hrtimer_wakeup)
   8.0% ( 23.8)      boost_sync/0 : queue_delayed_work_on (delayed_work_timer_fn)
   6.8% ( 20.4)      boost_sync/1 : queue_delayed_work_on (delayed_work_timer_fn)
   6.6% ( 19.6)       rcu_preempt : rcu_gp_kthread (process_timeout)
   4.9% ( 14.6)          immvibed : hrtimer_start_range_ns (hrtimer_wakeup)
   4.2% ( 12.4)          mdss_fb0 : hrtimer_start_range_ns (hrtimer_wakeup)
   4.1% ( 12.2)          mdss_fb0 : hrtimer_start (event_hrtimer_cb)
   3.2% (  9.6)          immvibed : hrtimer_start (tsp_timer_interrupt)
   2.8% (  8.2)         swapper/0 : hrtimer_start (lpm_hrtimer_cb)
   2.6% (  7.6)   oid.inputmethod : hrtimer_start_range_ns (hrtimer_wakeup)
   1.2% (  3.6)   oid.inputmethod : kgsl_pwrctrl_wake (kgsl_timer)
   1.2% (  3.6)         swapper/1 : hrtimer_start (tick_sched_timer)
   1.2% (  3.6)     system_server : hrtimer_start_range_ns (hrtimer_wakeup)
   1.0% (  3.0)              SSRM : Handler Th  hrtimer_start_range_ns (hrtimer_wakeup)
   0.9% (  2.6)         swapper/0 : hrtimer_start (tick_sched_timer)
   0.8% (  2.4)     WindowManager : hrtimer_start_range_ns (hrtimer_wakeup)
   0.7% (  2.2)   irq/441-fts_tou : queue_delayed_work_on (delayed_work_timer_fn)
   0.5% (  1.4)   com.android.mms : hrtimer_start_range_ns (hrtimer_wakeup)
   0.4% (  1.2)       kworker/1:2 : kgsl_pwrctrl_wake (kgsl_timer)
   0.4% (  1.2)        Thread-443 : hrtimer_start_range_ns (hrtimer_wakeup)
   0.3% (  1.0)          edmaudit : hrtimer_start_range_ns (hrtimer_wakeup)
   0.3% (  1.0)         swapper/0 : start_bandwidth_timer (sched_rt_period_timer)
```

Interrupt

Timer

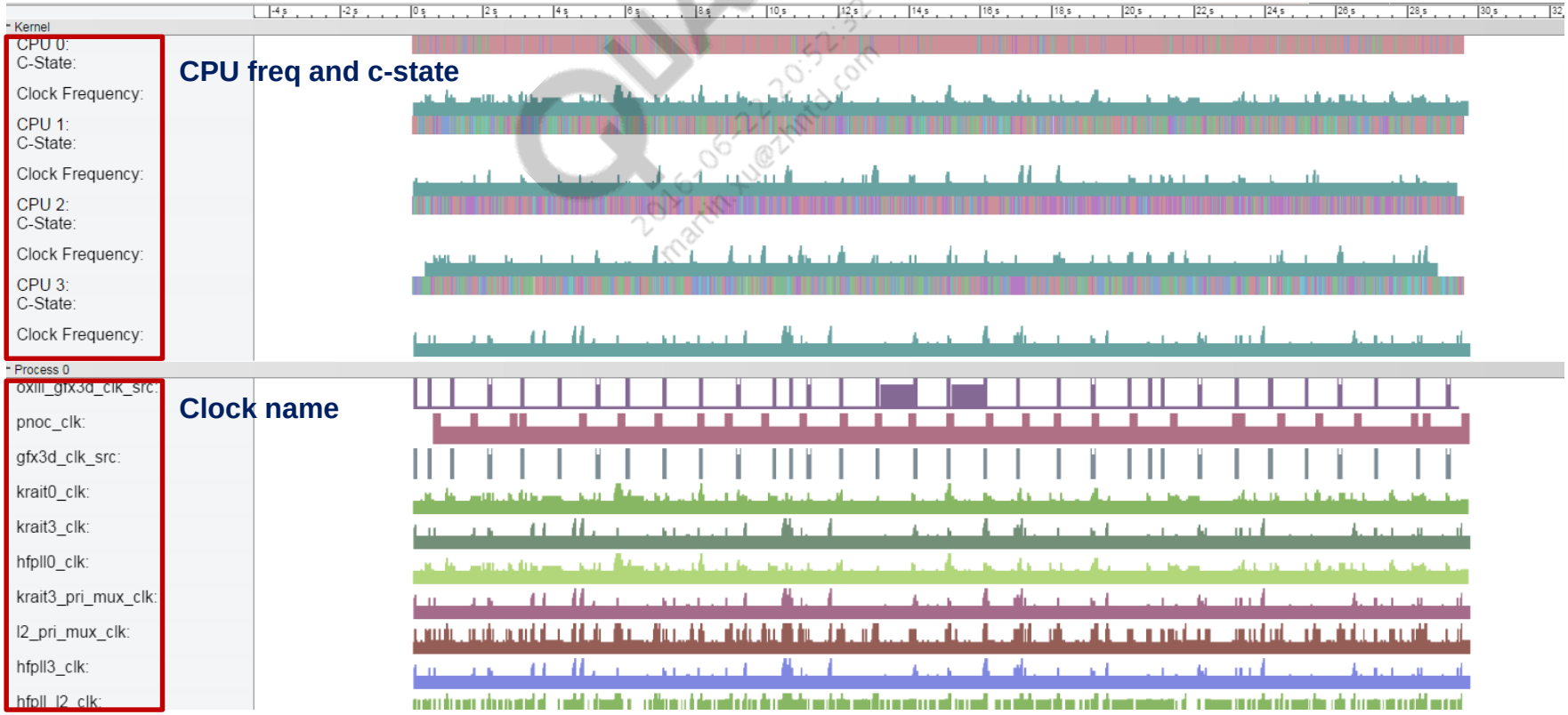
MSM BUS VOTING

- This tool is for monitoring the current clock frequency for each use case.
- Msmbusvoting.exe – Clock <clock name>, for example:
  - msmbusvoting.exe – Lock bimc_clk camss_vfe_cpp_clk camss_csi_vfe0_clk
  - camss_csi_vfe1_clk mdss_mdp_clk

bimc	camss_vfe_cpp	camss_csi_vfe0	camss_csi_vfe1	mdss_mdp
384000036	320000036	320002453	319998864	150000741
384002966	320002526	320000036	320000036	150001180
383998645	320002526	320002453	320000109	150000668
384001501	320000036	319998791	319998864	150001180
384002966	320002526	319998791	320000109	150000082
384002966	320002526	320000109	320000036	149999496
384002819	320002526	320000109	320002526	150000668
454587013	319998864	320000036	319998791	149999496
384001501	319998864	320000109	320001281	149999496
383998571	320001281	319998864	320001281	149999496
392812432	320000036	319998864	319998791	150000082
384001501	320000036	320000109	320002526	150000668
384001574	319998791	319998791	320001281	150000082
384001501	319998791	319998864	320002526	150000668
384001574	319998791	320002526	320002526	150001180
384001501	319998864	320000109	320001281	149999496
384000036	320000109	320000036	319998864	150001180
384002966	320001281	319998864	319998864	150000082
383998645	319998864	319998791	320002526	149999569
460798352	320000109	320001281	320002453	149999496
383998571	319998864	320001281	320002526	150000082
406894321	320000109	319998864	320002453	150000668
384000036	320002526	319998791	320002526	150001180

Systrace

Purpose	To identify CPU/GPU clock and state, other clock information, frame drop, execution time, CPU migration
Pros	There is a lot of information to check
Cons	Need to install SDK toolkit
Usage	Monitor



Clock Residency

- This is very useful data to check residency of each frequency based on systrace.
- If you provide systrace log, we will provide this residency data.

Purpose	To identify clock residency
Pros	Easy to see the residency of each clock
Cons	Need systrace data as an input data
Usage	Clock residency tool

Clock Residency (cont.)

BIMC_CLK	
-1	0%
0	0%
19.2	0%
37.5	0%
50	0%
75	0%
100	0%
150	0%
200	0%
259.2	79%
307.2	13%
393.6	8%
460.8	0%
528	0%
662.4	0%
796.8	0%

BIMC_MSMBUS_A_CLK	
-1	0%
0	0%
248.57732	70%
256	10%
258.99827	2%
261.07732	12%
306.97062	0%
366.1875	5%

	KRAIT0	KRAIT1	KRAIT2	KRAIT3
-1	0%	0%	0%	0%
0	37%	43%	46%	45%
300	0%	35%	39%	40%
345.6	0%	0%	0%	0%
422.4	0%	9%	6%	7%
499.2	0%	0%	0%	0%
576	0%	0%	0%	0%
652.8	48%	6%	3%	3%
729.6	7%	0%	1%	0%
806.4	0%	0%	0%	0%
883.2	3%	0%	0%	0%
960	0%	0%	0%	0%
1036.8	4%	4%	3%	3%
1113.6	0%	0%	0%	0%
1190.4	0%	0%	0%	1%
1267.2	0%	0%	1%	0%
1344	0%	0%	0%	0%
1420.8	0%	0%	0%	0%
1497.6	1%	1%	1%	0%
1574.4	0%	0%	0%	0%
1651.2	0%	0%	0%	0%
1728	0%	0%	0%	0%
1804.8	0%	0%	0%	0%
1881.6	0%	0%	0%	0%
1958.4	0%	0%	0%	0%
2035.2	0%	0%	0%	0%
2112	0%	0%	0%	0%
2188.8	0%	0%	0%	0%
2265.6	0%	0%	0%	0%
2342.4	0%	0%	0%	0%
2419.2	0%	0%	0%	0%

L2_CLK	
-1	0%
0	0%
499.2	60%
576	13%
960	0%
1036.8	20%
1267.2	7%

OXILI_GFX3D_CLK	
-1	0%
0	0%
27	77%
240	13%
300	10%

OXILI_GFX3D_CLK_SRC	
-1	0%
0	0%
27	77%
240	13%
300	10%

Oxili_3D	
-1	0%
0	77%
19.2	0%
37.5	0%
50	0%
75	0%
100	0%
200	0%
240	13%
300	10%
400	0%
466.8	0%
500	0%
600	0%

SurfaceFlinger

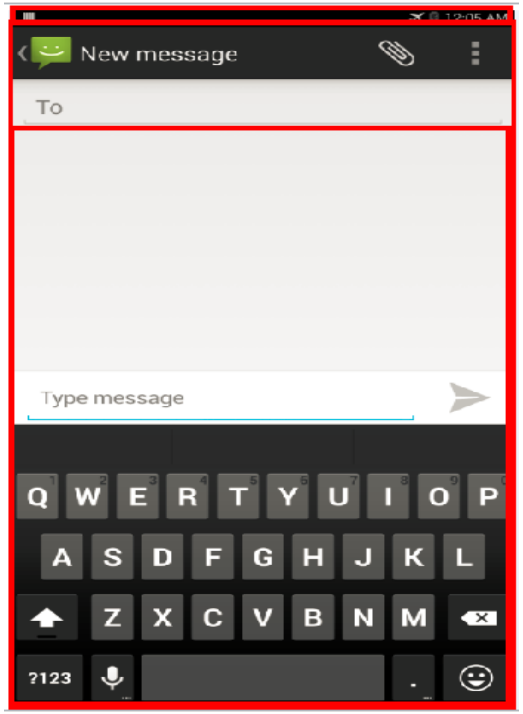
- SurfaceFlinger is the only service that can modify the content of the display.
- SurfaceFlinger uses OpenGL and Hardware Composer to compose a group of surfaces.
- As per SurfaceFlinger dump, there are 3 layers and 3 pipes used. The layers are updated every time as it is not cached.
- Provide information about total layer, used pipes, allocated buffer size, composition type, display panel type, etc.

SurfaceFlinger (cont.)

```
  type   | handle  | hints  | flags  | tr | blend | format |       source crop          |        frame        name
-----------+---------+---------+---------+----+-------+---------+----------------------------+----------------------------
     HWC | b727e818 | 00000002 | 00000000 | 00 | 00100 | 00000001 | [   0.0,   50.0, 1080.0, 1920.0] | [   0,   50, 1080, 1920] com.android.mms/com.android.mms.ui.ComposeMessageActivity
     HWC | b7266e98 | 00000002 | 00000000 | 00 | 00105 | 00000001 | [   0.0,    0.0, 1080.0, 1525.0] | [   0,  395, 1080, 1920] InputMethod
     HWC | b7269d78 | 00000002 | 00000000 | 00 | 00105 | 00000001 | [   0.0,    0.0, 1080.0,   75.0] | [   0,    0, 1080,   75] StatusBar
FB TARGET | b72c5d50 | 00000000 | 00000000 | 00 | 00105 | 00000001 | [   0.0,    0.0, 1080.0, 1920.0] | [   0,    0, 1080, 1920] HWC_FRAMEBUFFER_TARGET

Qualcomm HWC state:
  MDPVersion=500
  DisplayPanel=8
HWC Map for Dpy: "PRIMARY"
CURR_FRAME: layerCount: 3 mdpCount: 3 fbCount: 0
needsFBRedraw: NO  pipesUsed: 3  MaxPipesPerMixer: 4

 ---------------------------------------------
 listIdx | cached? | mdpIndex | comptype  |  Z
 ---------------------------------------------
    0    |   NO    |    0     |    MDP    |  0
    1    |   NO    |    1     |    MDP    |  1
    2    |   NO    |    2     |    MDP    |  2
```



kmsg

- Provides information about kernel
- To see any specific event, configure using the following command
  - adb shell cat /proc/kmsg | grep “keyword”

```
root@tblteatt:/ # cat /proc/kmsg | grep mpdecision
cat /proc/kmsg | grep mpdecision
<7>[  395.150563]  [0:      mpdecision: 5776] dwc3_cpu_notifier_cb: cpu online:1 irq:163
<7>[  399.249880]  [0:      mpdecision: 5777] dwc3_cpu_notifier_cb: cpu online:1 irq:163
<7>[  399.346442]  [0:      mpdecision: 5777] dwc3_cpu_notifier_cb: cpu online:1 irq:163
<7>[  399.511362]  [0:      mpdecision: 5777] dwc3_cpu_notifier_cb: cpu online:1 irq:163
<7>[  399.566640]  [0:      mpdecision: 5777] dwc3_cpu_notifier_cb: cpu online:1 irq:163
<7>[  399.618568]  [0:      mpdecision: 5777] dwc3_cpu_notifier_cb: cpu online:1 irq:163
<7>[  399.664516]  [0:      mpdecision: 5777] dwc3_cpu_notifier_cb: cpu online:1 irq:163
<7>[  399.771918]  [0:      mpdecision: 5777] dwc3_cpu_notifier_cb: cpu online:1 irq:163
<7>[  399.831813]  [0:      mpdecision: 5777] dwc3_cpu_notifier_cb: cpu online:1 irq:163
<7>[  399.891864]  [0:      mpdecision: 5777] dwc3_cpu_notifier_cb: cpu online:1 irq:163
<7>[  399.939231]  [0:      mpdecision: 5777] dwc3_cpu_notifier_cb: cpu online:1 irq:163
<7>[  399.990418]  [0:      mpdecision: 5777] dwc3_cpu_notifier_cb: cpu online:1 irq:163
<7>[  400.088644]  [0:      mpdecision: 5777] dwc3_cpu_notifier_cb: cpu online:1 irq:163
```

```
root@tblteatt:/ # cat /proc/kmsg | grep migration
cat /proc/kmsg | grep migration
<4>[  423.578772]  [1:     migration/1:   13] migrate_irqs: 10 callbacks suppressed
<4>[  423.578898]  [1:     migration/1:   13] IRQ163 no longer affine to CPU1
<4>[  428.139514]  [1:     migration/1:   13] IRQ163 no longer affine to CPU1
<4>[  430.327033]  [1:     migration/1:   13] IRQ163 no longer affine to CPU1
<4>[  437.905639]  [1:     migration/1:   13] IRQ163 no longer affine to CPU1
<4>[  440.580335]  [1:     migration/1:   13] IRQ163 no longer affine to CPU1
```

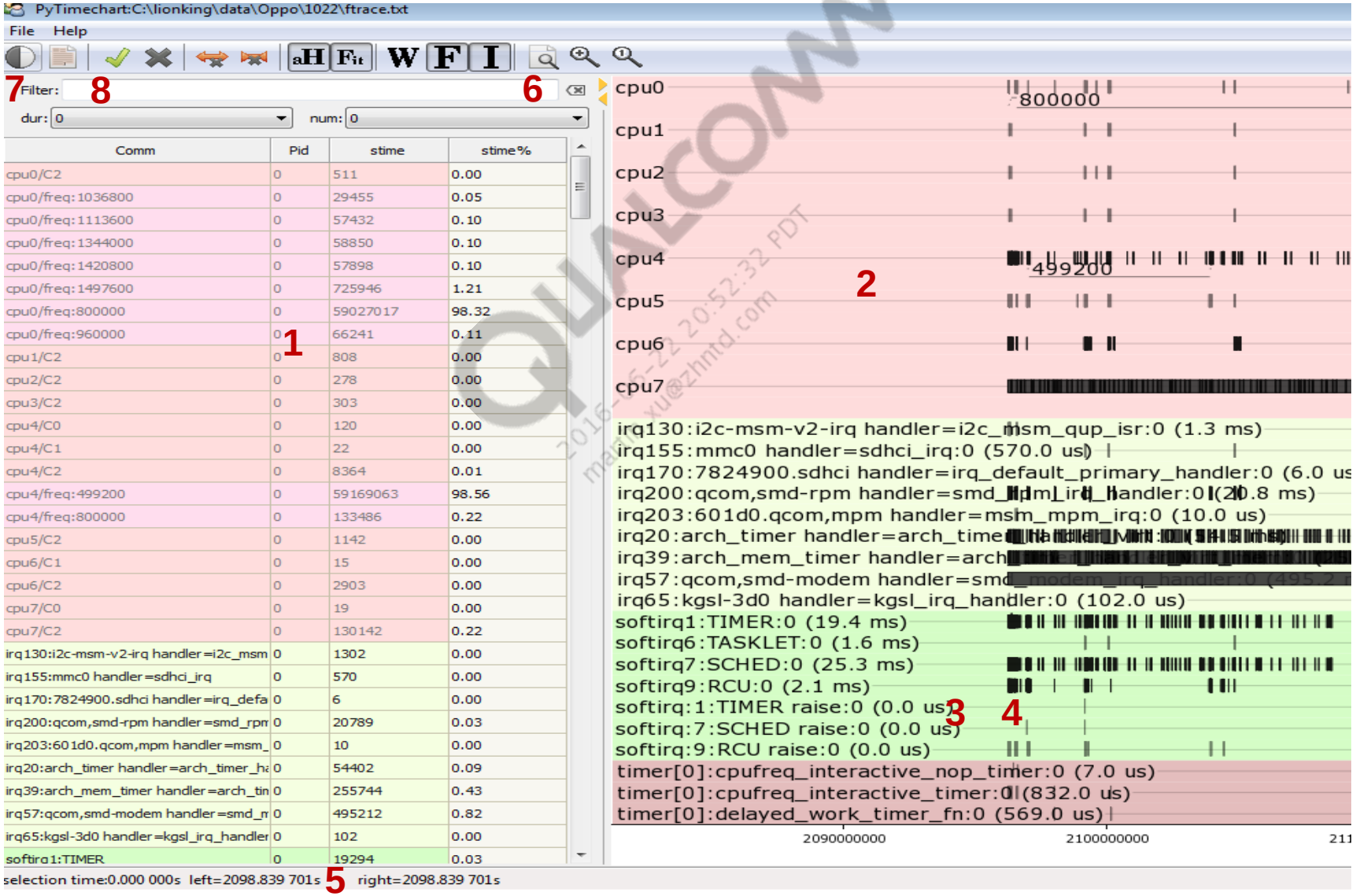
```
root@tblteatt:/ # cat /proc/kmsg | grep mdss
cat /proc/kmsg | grep mdss
<6>[  955.160520]  [0: surfaceflinger:  353] mdss_fb_blank_sub: FB_NUM:0, MDSS_FB_UNBLANK ++ on=0
<6>[  955.171969]  [0: surfaceflinger:  353] mdss_dsi_event_handler : MDSS_EVENT_UNBLANK
<6>[  955.188698]  [0: surfaceflinger:  353] mdss_dsi_panel_power_on : disp_en_gpio = 669
<6>[  955.188784]  [0: surfaceflinger:  353] mdss_dsi_panel_power_on : Set High LCD Enable disp_en GPIO
<3>[  955.194561]  [0: surfaceflinger:  353] mdss_dsi_ctrl_setup+: ctrl=f0833490 ndx=0
<6>[  955.196912]  [0: surfaceflinger:  353] mdss_dsi_host_init: Broadcast mode enabled.
<6>[  955.197067]  [0: surfaceflinger:  353] mdss_dsi_unblank+:
<3>[  955.198388]  [0: surfaceflinger:  353] mdss_dsi_ctrl_setup+: ctrl=f0833490 ndx=0
<6>[  955.200257]  [0: surfaceflinger:  353] mdss_dsi_host_init: Broadcast mode enabled.
<6>[  955.200357]  [0: surfaceflinger:  353] mdss_dsi_panel_on : ++
<6>[  955.200418]  [0: surfaceflinger:  353] mdss_dsi_panel_on: ctrl=f0833490 ndx=0
<6>[  955.200490]  [0: surfaceflinger:  353] mdss_dsi_panel_on: Broadcast mode. 1st ctrl(0). return..
<6>[  955.200576]  [0: surfaceflinger:  353] mdss_dsi_panel_on : --
<6>[  955.233553]  [0: surfaceflinger:  353] mdss_dsi_event_handler : MDSS_EVENT_UNBLANK
<6>[  955.244034]  [0: surfaceflinger:  353] mdss_dsi_panel_power_on : disp_en_gpio = 669
```

Pytime Chart

- Pytime chart is a visual tool to analyze Ftrace logs.
- The screenshot shown on the next slide is of the Pytime chart; the UI is mainly composed of the process list pane:
  - 1 – Time chart pane
  - 2 – Tool bar
- To use Pytime chart:
  1. Open the Pytime chart from the command line (pytime chart) or from the GUI.
  2. Select File→Open Trace File, which gives you a collected trace file.
  3. Press **7** to select events→press **8**→select all your events.
     Note: All the processes are shown in one page.
  4. Press **Page Down**/**Page Up** or mouse scroll to set the time chart via zoom/unzoom.
  5. Right-click the event from where you want to measure (see **3** in the picture) and drag it to the next event then right-click again (see **4**); the time interval is displayed at **5** if you want to see time interval between two events.
  6. Select the event as described in step 5, and press **6** to see text trace when you want to know more details of the event, i.e., text trace.

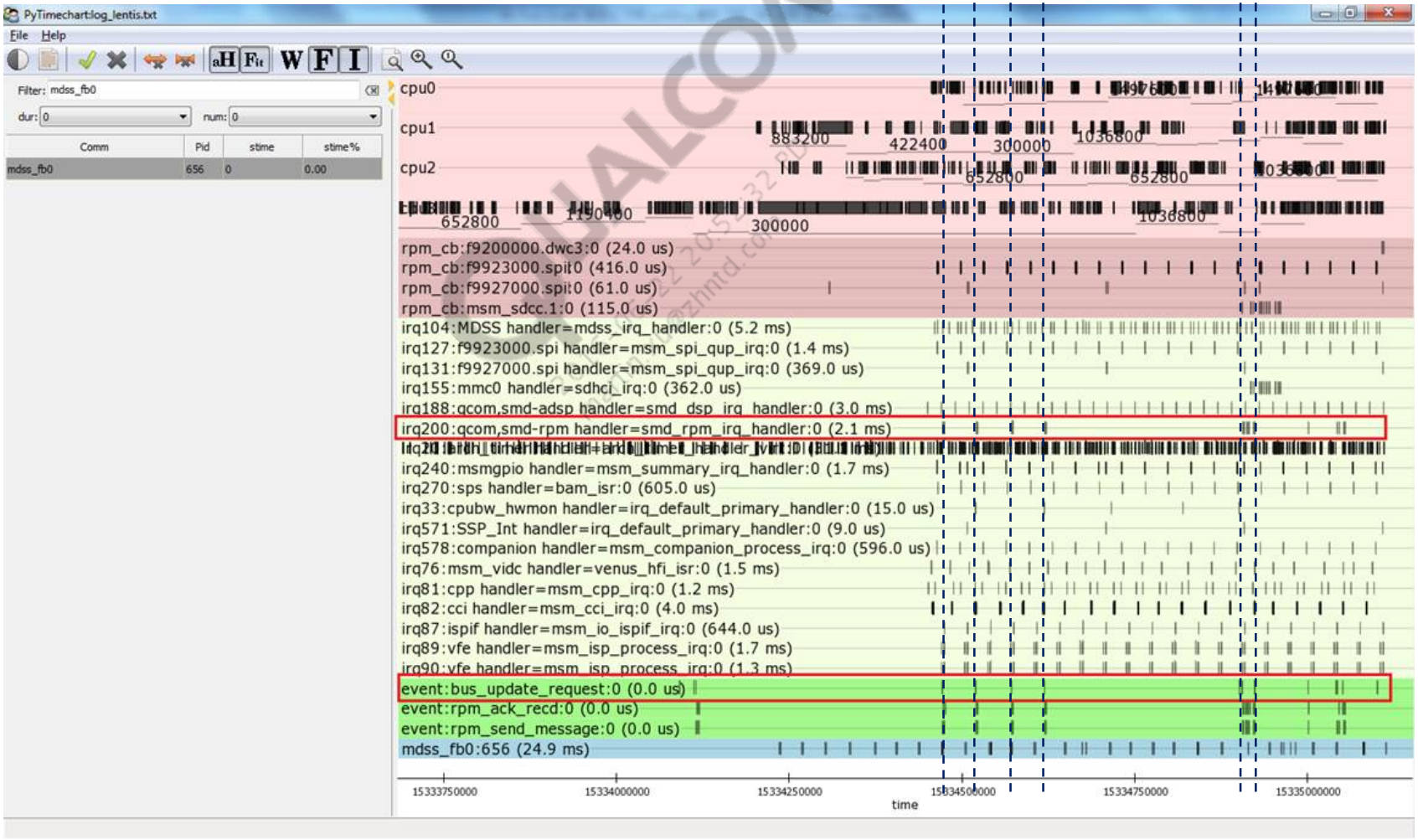
Note: All user space events show up in the process list pane in yellow color, starts with usr-<event-groupname>:<event-name> keep event-groupname and event-name very short, so that you can see them in the Pytime chart without any truncation.

Pytime Chart (cont.)



Pytime Chart (cont.)

- Pytime chart is a visual tool to analyze Ftrace logs.
- It is easy to figure out the root cause of the specific interrupt.



Clock Dump by ADB Command

- Provides information about currently active clocks and their frequencies
- If you want to compare to the data of MTP and your target, you can request Qualcomm Technologies, Inc. (QTI) to provide this data or you can provide QTI with your data to verify
- When you check the clock frequency, you also need to check clock plan and voltage plan for the correct voltage level; usually, higher clock frequency on the component causes higher power consumption

Clock Dump by ADB Command (cont.)

Active

Clock freq

```
bb_clk2_pin => enable:1 rate:1000
bimc_a_clk => enable:1 rate:99942400
bimc_clk => enable:1 measure:100000457
bimc_msmbus_a_clk => enable:1 rate:503500000
bimc_msmbus_clk => enable:1 rate:50000000
dsi_vco_clk => enable:1 rate:512000000
esc1_clk_src => enable:1 rate:19200000
gcc_blsp2_ahb_clk => enable:1 measure:4800073
gcc_blsp2_qup4_i2c_apps_clk => enable:1 measure:50000320
gcc_sdcc1_ahb_clk => enable:1 measure:25000141
gcc_sdcc1_apps_clk => enable:0 measure:0
gcc_usb2a_phy_sleep_clk => enable:1 measure:34605
gcc_usb30_sleep_clk => enable:1 measure:0
gcc_usb_hsic_io_cal_sleep_clk => enable:1 measure:34605
gfx3d_clk_src => enable:1 rate:240000000
gpll0_ao_clk_src => enable:1 rate:600000000
gpll0_clk_src => enable:1 rate:600000000
hfpll0_clk => enable:1 rate:1497600000
hfpll2_clk => enable:0 rate:1497600000
hfpll_l2_clk => enable:1 rate:960000000
hfpll_src_clk => enable:1 rate:19200000
krait0_clk => enable:1 measure:739375404
krait0_pri_mux_clk => enable:1 rate:960000000
krait1_clk => enable:1 measure:883196920
krait2_clk => enable:1 measure:253891176
krait2_pri_mux_clk => enable:1 rate:1036800000
krait3_clk => enable:0 measure:682341536
krait3_pri_mux_clk => enable:1 rate:1497600000
l2_clk => enable:1 measure:1267200144
l2_pri_mux_clk => enable:1 rate:1267200000
mdp_clk_src => enable:1 rate:150000000
mdss_ahb_clk => enable:1 measure:2500098
mdss_axi_clk => enable:1 measure:150000668
mdss_byte0_clk => enable:1 measure:127996814
mdss_byte1_clk => enable:0 measure:0
ocmemgx_clk => enable:1 rate:200000000
ocmemgx_core_clk => enable:1 rate:1000
ocmemgx_msmbus_clk => enable:1 rate:200000000
pixel_clk_src => enable:1 rate:170666666
pnoc_a_clk => enable:1 rate:19200000
```

Inactive

```
bb_clk2_pin => enable:1 rate:1000
bimc_a_clk => enable:1 rate:50000000
bimc_clk => enable:1 measure:307201135
bimc_msmbus_a_clk => enable:1 rate:366187500
bimc_msmbus_clk => enable:1 rate:50000000
dsi_vco_clk => enable:1 rate:512000000
esc0_clk_src => enable:1 rate:19200000
esc1_clk_src => enable:1 rate:19200000
gcc_blsp2_ahb_clk => enable:1 measure:4800073
gcc_blsp2_qup4_i2c_apps_clk => enable:1 measure:49999954
gcc_usb2a_phy_sleep_clk => enable:1 measure:32627
gcc_usb30_sleep_clk => enable:1 measure:0
gcc_usb_hsic_io_cal_sleep_clk => enable:1 measure:32627
gfx3d_clk_src => enable:1 rate:300000000
gpll0_ao_clk_src => enable:1 rate:600000000
gpll0_clk_src => enable:1 rate:600000000
hfpll0_clk => enable:1 rate:2457600000
hfpll1_clk => enable:1 rate:2457600000
hfpll2_clk => enable:1 rate:2457600000
hfpll3_clk => enable:1 rate:2457600000
hfpll_l2_clk => enable:1 rate:1728000000
hfpll_src_clk => enable:1 rate:19200000
krait0_clk => enable:1 measure:2004527076
krait0_pri_mux_clk => enable:1 rate:2457600000
krait1_clk => enable:1 measure:2572819772
krait1_pri_mux_clk => enable:1 rate:2649600000
krait2_clk => enable:1 measure:2457590768
krait2_pri_mux_clk => enable:1 rate:2265600000
krait3_clk => enable:1 measure:2106959592
krait3_pri_mux_clk => enable:1 rate:2496000000
l2_clk => enable:1 measure:1727993700
l2_pri_mux_clk => enable:1 rate:1728000000
mdp_clk_src => enable:1 rate:150000000
mdss_ahb_clk => enable:1 measure:2743762
mdss_axi_clk => enable:1 measure:333429885
mdss_byte0_clk => enable:1 measure:127997766
mdss_byte1_clk => enable:1 measure:127997766
mdss_esc0_clk => enable:1 measure:19200183
mdss_esc1_clk => enable:1 measure:19200256
mdss_mdp_clk => enable:1 measure:150000082
```


Clock Dump by Trace 32

Purpose	To identify clock information
Pros	Capture every clock and easy to check for each clock
Cons	Need to install Trace 32 and data can be captured at a particular moment
Usage	Trace 2 command

Clock	State	Frequency (MHz)	CBCR Addr : Value	CBCR Type
gcc_bam_dma_ahb_clk	OFF	0	0xFC400D44 : 0x8000CFF0	sm_pscbc
gcc_bam_dma_inactivity_timers_clk	OFF	0	0xFC400D48 : 0x80000000	sm_cbc
gcc_bimc_cfg_ahb_clk	ON	37.500974	0xFC40110C : 0x20008001	sm_cbc
gcc_bimc_clk	ON	200.001586	0xFC401118 : 0x00000001	sm_cbc
gcc_bimc_kpss_axi_clk	OFF	0	0xFC40111C : 0x80000000	sm_cbc
gcc_bimc_sleep_clk	ON	0.033687	0xFC401110 : 0x00000001	sm_cbc
gcc_bimc_sysnoc_axi_clk	ON	150.000677	0xFC401114 : 0x20008001	sm_cbc
gcc_bimc_xo_clk	ON	19.200585	0xFC401108 : 0x00000001	sm_cbc
gcc_blsp1_ahb_clk	ON	19.200585	0xFC4005C4 : 0x2000CFF0	sm_pscbc
gcc_blsp1_sleep_clk	OFF	0	0xFC4005C8 : 0x80000000	sm_cbc
gcc_blsp1_qup1_i2c_apps_clk	OFF	0	0xFC400648 : 0x80000000	sm_cbc
gcc_blsp1_qup1_spi_apps_clk	OFF	0	0xFC400644 : 0x80000000	sm_cbc
gcc_blsp1_qup2_i2c_apps_clk	OFF	0	0xFC4006C8 : 0x80000000	sm_cbc
gcc_blsp1_qup2_spi_apps_clk	OFF	0	0xFC4006C4 : 0x80000000	sm_cbc
gcc_blsp1_qup3_i2c_apps_clk	OFF	0	0xFC400748 : 0x80000000	sm_cbc
gcc_blsp1_qup3_spi_apps_clk	OFF	0	0xFC400744 : 0x80000000	sm_cbc
gcc_blsp1_qup4_i2c_apps_clk	OFF	0	0xFC4007C8 : 0x80000000	sm_cbc
gcc_blsp1_qup4_spi_apps_clk	OFF	0	0xFC4007C4 : 0x80000000	sm_cbc
gcc_blsp1_qup5_i2c_apps_clk	OFF	0	0xFC400848 : 0x80000000	sm_cbc
gcc_blsp1_qup5_spi_apps_clk	OFF	0	0xFC400844 : 0x80000000	sm_cbc
gcc_blsp1_qup6_i2c_apps_clk	OFF	0	0xFC4008C8 : 0x80000000	sm_cbc
gcc_blsp1_qup6_spi_apps_clk	OFF	0	0xFC4008C4 : 0x80000000	sm_cbc
gcc_blsp1_uart1_apps_clk	OFF	0	0xFC400684 : 0x80000000	sm_cbc
gcc_blsp1_uart1_sim_clk	OFF	0	0xFC400688 : 0x80000000	sm_cbc
gcc_blsp1_uart2_apps_clk	ON	7.373528	0xFC400704 : 0x00000001	sm_cbc
gcc_blsp1_uart2_sim_clk	OFF	0	0xFC400708 : 0x80000000	sm_cbc
gcc_blsp1_uart3_apps_clk	OFF	0	0xFC400784 : 0x80000000	sm_cbc
gcc_blsp1_uart3_sim_clk	OFF	0	0xFC400788 : 0x80000000	sm_cbc
gcc_blsp1_uart4_apps_clk	OFF	0	0xFC400804 : 0x80000000	sm_cbc

Clock	State	Frequency (MHz)	CBCR Addr : Value	CBCR Type
gcc_bam_dma_ahb_clk	OFF	0	0xFC400D44 : 0x8000CFF0	sm_pscbc
gcc_bam_dma_inactivity_timers_clk	OFF	0	0xFC400D48 : 0x80000000	sm_cbc
gcc_bimc_cfg_ahb_clk	ON	19.201171	0xFC40110C : 0x20008001	sm_cbc
gcc_bimc_clk	ON	100.001525	0xFC401118 : 0x00000001	sm_cbc
gcc_bimc_kpss_axi_clk	OFF	0	0xFC40111C : 0x80000000	sm_cbc
gcc_bimc_sleep_clk	ON	0.033687	0xFC401110 : 0x00000001	sm_cbc
gcc_bimc_sysnoc_axi_clk	ON	19.200585	0xFC401114 : 0x20008001	sm_cbc
gcc_bimc_xo_clk	ON	19.200585	0xFC401108 : 0x00000001	sm_cbc
gcc_blsp1_ahb_clk	ON	19.200585	0xFC4005C4 : 0x2000CFF0	sm_pscbc
gcc_blsp1_sleep_clk	OFF	0	0xFC4005C8 : 0x80000000	sm_cbc
gcc_blsp1_qup1_i2c_apps_clk	OFF	0	0xFC400648 : 0x80000000	sm_cbc
gcc_blsp1_qup1_spi_apps_clk	OFF	0	0xFC400644 : 0x80000000	sm_cbc
gcc_blsp1_qup2_i2c_apps_clk	OFF	0	0xFC4006C8 : 0x80000000	sm_cbc
gcc_blsp1_qup2_spi_apps_clk	OFF	0	0xFC4006C4 : 0x80000000	sm_cbc
gcc_blsp1_qup3_i2c_apps_clk	OFF	0	0xFC400748 : 0x80000000	sm_cbc
gcc_blsp1_qup3_spi_apps_clk	OFF	0	0xFC400744 : 0x80000000	sm_cbc
gcc_blsp1_qup4_i2c_apps_clk	OFF	0	0xFC4007C8 : 0x80000000	sm_cbc
gcc_blsp1_qup4_spi_apps_clk	OFF	0	0xFC4007C4 : 0x80000000	sm_cbc
gcc_blsp1_qup5_i2c_apps_clk	OFF	0	0xFC400848 : 0x80000000	sm_cbc
gcc_blsp1_qup5_spi_apps_clk	OFF	0	0xFC400844 : 0x80000000	sm_cbc
gcc_blsp1_qup6_i2c_apps_clk	OFF	0	0xFC4008C8 : 0x80000000	sm_cbc
gcc_blsp1_qup6_spi_apps_clk	OFF	0	0xFC4008C4 : 0x80000000	sm_cbc
gcc_blsp1_uart1_apps_clk	OFF	0	0xFC400684 : 0x80000000	sm_cbc
gcc_blsp1_uart1_sim_clk	OFF	0	0xFC400688 : 0x80000000	sm_cbc
gcc_blsp1_uart2_apps_clk	ON	7.374114	0xFC400704 : 0x00000001	sm_cbc
gcc_blsp1_uart2_sim_clk	OFF	0	0xFC400708 : 0x80000000	sm_cbc
gcc_blsp1_uart3_apps_clk	OFF	0	0xFC400784 : 0x80000000	sm_cbc
gcc_blsp1_uart3_sim_clk	OFF	0	0xFC400788 : 0x80000000	sm_cbc

NPA Dumps

- Provides information on subsystems voting for shared resources
- This is very useful information to know which subsystem is requesting higher bandwidth and hence causing higher power for that particular power domain/rail
- Real bandwidth will be decided by the maximum requested bandwidth

```
npa_resource (name: "/sleep/uber") (handle: 0x196b78) (units: on/off) (resource max: 7) (active max: 7) (active state: 7) (active headroom: -8) (request state:
4294967295)
        npa_client (name: sleep) (handle: 0x196da8) (resource: 0x196b78) (type: NPA_CLIENT_REQUIRED) (request: 4294967295)
        npa_client (name: vddmx) (handle: 0x196de0) (resource: 0x196b78) (type: NPA_CLIENT_REQUIRED) (request: 4)
        npa_client (name: vddcx) (handle: 0x196e18) (resource: 0x196b78) (type: NPA_CLIENT_REQUIRED) (request: 2)
        end npa_resource (handle: 0x196b78)
npa_resource (name: "/clk/qdss") (handle: 0x199318) (units: STATE) (resource max: 3) (active max: 3) (active state: 0) (active headroom: -3) (request state: 0)
        npa_client (name: MPSS) (handle: 0x19c8b0) (resource: 0x199318) (type: NPA_CLIENT_LIMIT_MAX) (request: 4294967295)
        npa_client (name: MPSS) (handle: 0x19c870) (resource: 0x199318) (type: NPA_CLIENT_REQUIRED) (request: 0)
        npa_client (name: WCSS) (handle: 0x19c430) (resource: 0x199318) (type: NPA_CLIENT_LIMIT_MAX) (request: 4294967295)
        npa_client (name: WCSS) (handle: 0x19c3f0) (resource: 0x199318) (type: NPA_CLIENT_REQUIRED) (request: 0)
        npa_client (name: LPASS) (handle: 0x19be38) (resource: 0x199318) (type: NPA_CLIENT_LIMIT_MAX) (request: 4294967295)
        npa_client (name: LPASS) (handle: 0x19bdf8) (resource: 0x199318) (type: NPA_CLIENT_REQUIRED) (request: 0)
        npa_client (name: qdssrpm) (handle: 0x196d70) (resource: 0x199318) (type: NPA_CLIENT_REQUIRED) (request: 0)
        npa_client (name: debugger) (handle: 0x196e50) (resource: 0x199318) (type: NPA_CLIENT_REQUIRED) (request: 0)
        end npa_resource (handle: 0x199318)
npa_resource (name: "/clk/mmnoc_ahb") (handle: 0x1992c8) (units: KHz) (resource max: 80000) (active max: 80000) (active state: 40000) (active headroom: -40000)
(request state: 40000)
        npa_client (name: APSS) (handle: 0x196c58) (resource: 0x1992c8) (type: NPA_CLIENT_LIMIT_MAX) (request: 4294967295)
        npa_client (name: APSS) (handle: 0x196c90) (resource: 0x1992c8) (type: NPA_CLIENT_REQUIRED) (request: 40000)
        end npa_resource (handle: 0x1992c8)
npa_resource (name: "/clk/bimc" (handle: 0x199278) (units: KHz) (resource max: 333333) (active max: 333333) (active state: 333333) (active headroom: -35833) (request
 state: 297500)
        npa_client (name: MPSS) (handle: 0x19c690) (resource: 0x199278) (type: NPA_CLIENT_LIMIT_MAX) (request: 4294967295)
        npa_client (name: MPSS) (handle: 0x19c650) (resource: 0x199278) (type: NPA_CLIENT_REQUIRED) (request: 200000)
        npa_client (name: WCSS) (handle: 0x19c3a8) (resource: 0x199278) (type: NPA_CLIENT_LIMIT_MAX) (request: 4294967295)
        npa_client (name: WCSS) (handle: 0x19c368) (resource: 0x199278) (type: NPA_CLIENT_REQUIRED) (request: 0)
        npa_client (name: LPASS) (handle: 0x19c058) (resource: 0x199278) (type: NPA_CLIENT_LIMIT_MAX) (request: 4294967295)
        npa_client (name: LPASS) (handle: 0x19c018) (resource: 0x199278) (type: NPA_CLIENT_REQUIRED) (request: 0)
        npa_client (name: APSS) (handle: 0x19b8d0) (resource: 0x199278) (type: NPA_CLIENT_LIMIT_MAX) (request: 4294967295)
        npa_client (name: APSS) (handle: 0x19b890) (resource: 0x199278) (type: NPA_CLIENT_REQUIRED) (request: 297500)
        npa_client (name: ICB Driver) (handle: 0x196f68) (resource: 0x199278) (type: NPA_CLIENT_REQUIRED) (request: 177648)
        end npa_resource (handle: 0x199278)
npa_resource (name: "/clk/pnoc") (handle: 0x196980) (units: KHz) (resource max: 100000) (active max: 100000) (active state: 50000) (active headroom: -50000) (request
```

Real bandwidth

Maximum request

MSM Bus Requests

- Provides information about the latest bus bandwidth request as ab and ib.
- Masters ID is a caller and slaves ID is a callee.
- You can check masters ID and slaves ID in arch/arm/mach-msm/include/ mach/msm_bus_board.h.

```
cat mdss_mdp
157306.118032626
curr    : 1
masters: 22
slaves : 512
ab      : 890265600
ib      : 3200000000

157306.127250803
curr    : 2
masters: 22
slaves : 512
ab      : 1335398400
ib      : 3200000000

157308.351429170
curr    : 1
masters: 22 Caller
slaves : 512 Callee

slaves : 512
ab      : 445132800
ib      : 333849600
```

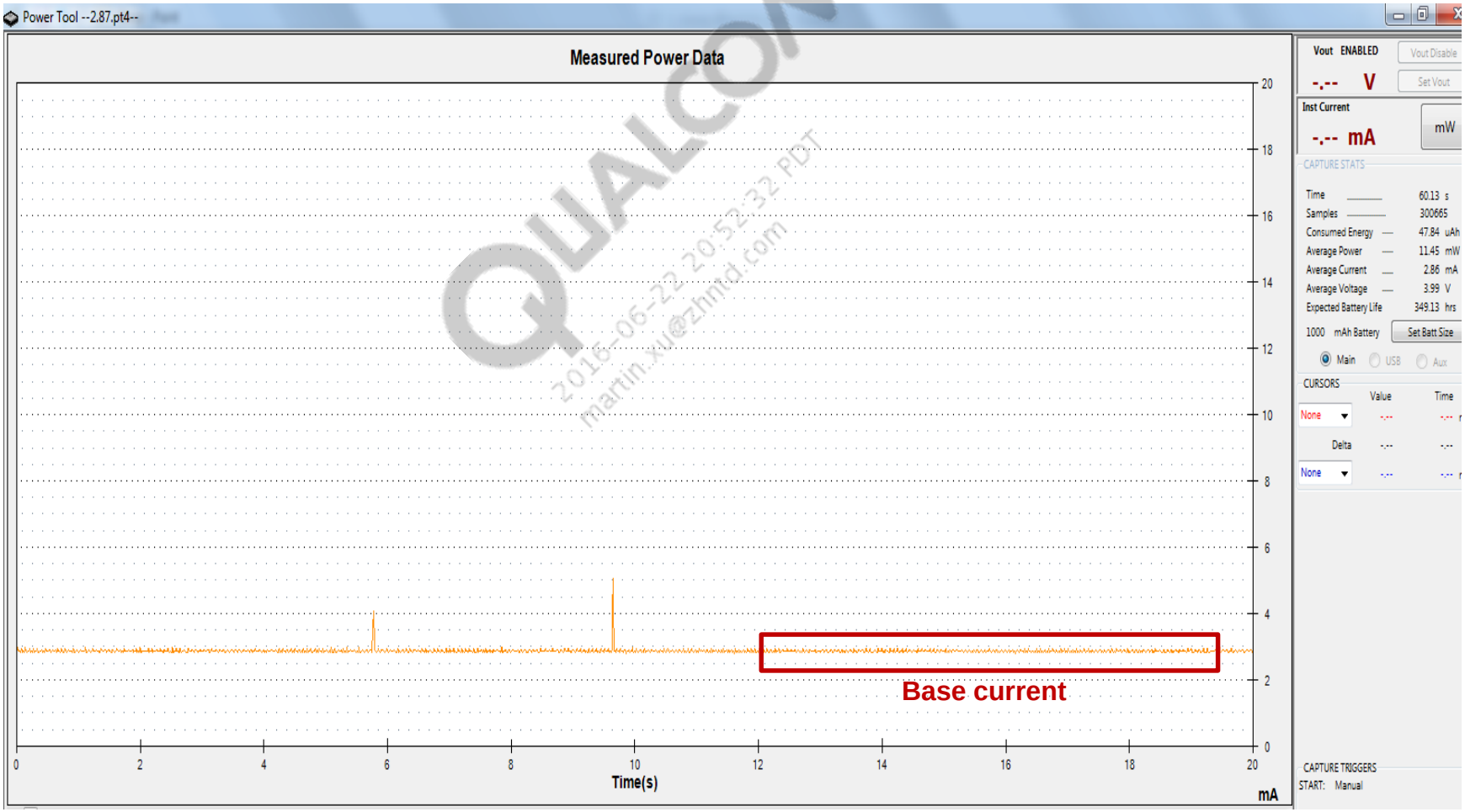
Purpose	To identify voting value for each subsystem in the apps processor
Pros	Easy to check the bus bandwidth for each subsystem
Cons	Apps processor only
Usage	Cat /d/msm-bus-dbg/client-data/<subsystem name>

Snapdragon™ Performance Visualizer

- SPV provides a web interface to a suite of performance analysis, debug, system overview, power, and monitoring tools for Android and other Linux-based platforms providing rich graphical and command line views.

Waveform

- To measure the current consumption and analyze the pattern or base current



Power Rail Breakdown

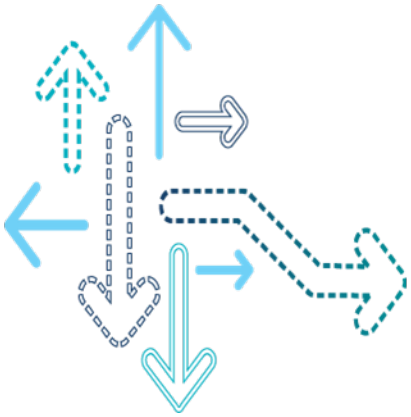
- Compare power rail data and figure out the difference in power gap of power rail
  - Customer device

	RCM channel	Regulator	Volts	I (mA)	Cal battery @ 4v (mA)
Display	35	PWR_WLED	3.83 V	90.59	90.59
	36	PWR_HRLED	3.85 V	0.01	0.01
	63	PWR_DISP	3.84 V	29.75	29.75
	53	eMMC_1P8 [LDO,L5,SUB SMPS,S4]	1.79 V	0.9	0.53
	129	LCD1_MIPI [LDO,L6,SUB SMPS,S4]	1.77 V	20.23	11.84
Touch	60	Cap TS_2P85 [LDO,L17]	2.84 V	0.86	0.86
	25	Cap TS_1P8 [LDO,L6,SUB SMPS,S4]	1.78 V	1.04	0.61
LCD					**134.19**
	3	**S1_OUTPUT [MSS, SMPS,S1]**	1.00 V	3.79	1.1
	8	**S2_OUTPUT [CX, GFX, MDSP, CDC, SMPS, S 2]**	1.24 V	687.47	267.57

  - MTP

	RCM channel	Regulator	Volts	I (mA)	Cal battery @ 4v (mA)
Display	35	PWR_WLED	3.85 V	89.97	89.97
	36	PWR_HRLED	3.87 V	0	0
	63	PWR_DISP	3.85 V	29.75	29.75
	53	eMMC_1P8 [LDO,L5,SUB SMPS,S4]	1.79 V	0.08	0.04
	129	LCD1_MIPI [LDO,L6,SUB SMPS,S4]	1.77 V	20.29	11.86
Touch	25	Cap TS_1P8 [LDO,L6,SUB SMPS,S4]	1.78 V	0.72 mA	0.42
	60	Cap TS_2P85 [LDO,L17]	2.84 V	0.64 mA	0.64
LCD					**132.68**
	3	**S1_OUTPUT [MSS, SMPS,S1]**	0.99 V	0.27	0.14
	8	**S2_OUTPUT [CX, GFX, MDSP, CDC, SMPS, S2]**	1.23 V	640.02	242.64

Debugging Approach



Checking Point for Multimedia Use Case

No.	Use case	Checking point
1	MP3 Playback	1. Any customized audio post-processing to improve audio-quality 2. Audio off-load/Non off-load mode 3. Need to make sure LPASS bandwidth voting 4. CPU, BIMC clocks
2	Camera	1. Make sure what customization or enhancement made for camera features on top of QTI default camera implementation 2. Power impact by camera features (ZSL, FD, AF, HDR, AWB…) 3. Panel type (Video mode/Command mode) 4. Software setting (Mime-type, resolution, fps, scaling, etc.) 5. hardware setting (VFE (single, dual), sensor size, OIS, etc.)
3	Video	1. Panel type (Video mode/Command mode) 2. Display resolution 3. DDR (RAM size) 4. LCD/LED/AMOLED panel 5. Audio Off-load/Non off-load mode 6. Video core clock (Venus)
4	Static Image Display	1. Panel type (Video mode/Command mode) 2. Display resolution 3. DDR (RAM size) 4. LCD/LED/AMOLED panel 5. XO shutdown/VDDmin 6. Idle PC check 7. Baseline power is high/current consumption is high because of frequent wakeup
5	Graphics	1. Panel type (Video mode/Command mode) 2. Display resolution 3. DDR (RAM size) 4. LCD/LED/AMOLED panel 5. Check number of layers 6. Composition is done by MDP or GPU 7. Check GPU, BIMC, CPU clocks

Video Playback Use Case

No.	STEP	Reference
1	Compare the power of your device with the QTI reference power data.	▪ *MSM8994 Linux Android Current Consumption Data* (80-NJ051-7) ▪ *MSM8936/MSM8939 Linux Android Current Consumption Data* (80-NM683-7)
2	Capture the full breakdown and compare it with the video playback breakdown.	
3	Identify which power rail is higher than the QTI power data and determine what subsystems are using it.	
4	Capture a clock dump to analyze the subsystems.	Trace 32 Systrace ADB command
5	Compare the captured data with the video playback clock plan to determine which clock is high.	
5-1	If CPU clock is high, capture CPU-related information by PowerTop and top.	
5-1-1	Determine which process is consuming the most CPU usage and look for any processes that should not be running and interrupt. If there is unexpected process or thread, talk with the correct engineer for the process or thread. If there is no unexpected process or thread, look into the high CPU usage process or thread using perf top. If you find out the module with high usage rate by perf top, talk with the proper engineer. If there is unexpected interrupt, check the pytime chart to find out the source of the interrupt. If there is no special thing, you need to tune the CPU clock by scaling_min_freq or the parameters of interactive governor.	
5-2	If MDP clock is high, capture the SurfaceFlinger information by dumpsys and compare with MTP. Compare the clock voting in the d/msm-bus-dbg/client-data/mdss_mdp path with the MTP.	adb shell dumpsys SurfaceFlinger adb shell cat /d/ msm-bus-dbg/ client-data/ mdss_mdp
5-3	If other clock is high, file a case with the debugging information Clock dump, Waveform, PowerTop, top, Systrace data, power rail breakdown data.	

MP3 Playback Use Case

No.	Step	Reference
1	Compare the power of your device with the QTI reference power data.	▪ *MSM8994 Linux Android Current Consumption Data (*80-NJ051-7) ▪ *MSM8936/MSM8939 Linux Android Current Consumption Data* (80-NM683-7)
2	We recommend the use of Tunnel mode. If Tunnel mode playback is not working, it will result in high current consumption. To identify if Tunnel mode playback is enabled, use the command adb logcat > c:\<your directory>\logcat.txt. If you can see the following log, Tunnel mode is not enabled. D/AudioPolicyManager(227): copl: offload disabled by audio.offload.disable=1 In this case, you can enable Tunnel mode using the following command. adb pull /system/build.prop <your directory name on PC> Add audio.offload.disable=0 to the build.prop file adb push <yourdirectory name on PC>\build.prop /system Even though you enable the offload, you may not play in offload because of offload minimum duration. It has to be less than total duration time. Please check the current value by the command below. adb shell getprop audio.offload.min.duration.secs You can set the duration by the command below. adb shell setprop audio.offload.min.duration.secs xx (seconds)	
3	Check your waveform and look for frequent wakeups or a high baseline current.	
3-1	If frequent wakeups, frequent interrupts can prevent a device from going into idle power collapse. To debug this further, debug logs such as PowerTop, Top, Ftrace, and interrupts are necessary.	Refer to Power Tools
3-2	If high baseline current, capture the full breakdown and compare it with the mp3 breakdown. Determine if a major power rail, e.g., CX, MX, DDR, or CPU, is consuming more current than the reference mp3 breakdown. Check the MX and CX voltage levels. If DDR/MX is consuming more current, read-write or extra logging may be occurring. Using the clock dump, determine if the level of clocks is too high, e.g., if the MSS Q6 clock is running higher than expected, bump up the digital core voltage (VDDCX) to the next voltage level, which will result in high current consumption. Determine if any extra audio postprocessing is enabled. This results in an increase in CX voltage and hence an increase in the baseline current. Extra audio postprocessing also results in a higher Q6 core clock frequency. Disable audio postprocessing and rerun the test.	▪ *MSM8994 Linux Android Current Consumption Data* (80-NJ051-7) ▪ *MSM8936/MSM8939 Linux Android Current Consumption Data* (80-NM683-7)
4	If mp3 power issues are still unresolved, file a case with the debugging information Waveform, PowerTop, Top, Ftrace, captured power rail breakdown, clock dump	

Camera Use Case

No.	Step	Reference
1	Need to check the camera-related new feature with internal engineer first. Compare the power of your device with the QTI reference power data.	▪ *MSM8994 Linux Android Current Consumption Data* (80-NJ051-7) ▪ *MSM8936/MSM8939 Linux Android Current Consumption Data* (80-NM683-7)
2	Differences in hardware and software configuration will result in a difference in power. File a case if your device configuration is different from the QTI reference.	
3	If your device configuration is the same as the QTI reference and you still see a power difference, capture the rail level breakdown and compare it against QTI reference breakdown available in the document of the reference column. If there is no data for the breakdown, you can file a case and request the data. Check which rail the major power delta is coming from, e.g., CPU, CX (digital core), or DDR.	
3-1	CPU power is high. Compare the interactive governor, CPU-related parameters (Thread migration setting, CPU Bus DCVS) from your target and the QTI default parameters. Determine if any software algorithm changes have been made, e.g., the 3A (AF, AEC, AWB) algorithm, as modification of software algorithms will result in a power difference. Capture CPU-related information by PowerTop and Top. Determine which process is consuming the most CPU usage and look for any processes that should not be running and interrupt. If there is unexpected process or thread, talk with the correct engineer for the process or thread. If there is no unexpected process or thread, look into the high CPU usage process or thread using Perftop. If you find out the module with high usage rate by Perftop, talk with the proper engineer. If there is unexpected interrupt, check the pytime chart to find out the source of interrupt. If there is no special thing, tune the CPU clock by scaling_min_freq or the parameters of the interactive governor.	
3-2	Digital core power is high. Compare the CX rail voltage and current with the QTI reference rail level breakdown data available for the 1080p encode use case in the document of the reference column. Capture the clock dump and ensure all major clocks are aligned with the reference clock plan. Clock dumps can be captured via JTAG, adb command, or systrace. If any of the clocks are relatively high, file a case and attach the clock dump. Capture dumpsys SurfaceFlinger logs to determine the number of hardware layers and the composition type used.	
4	If power is still high, file a case and provide the hardware specification, software algorithm changes compared to QTI. Debug logs (PowerTop, Top, systrace, Ftrace, clock dump, rail level power breakdown, etc.).	

Graphics Use Case

No.	Step	Reference
1	Compare the power of your device with the QTI reference power data.	▪ *MSM8994 Linux Android Current Consumption Data* (80-NJ051-7) ▪ *MSM8936/MSM8939 Linux Android Current Consumption Data* (80-NM683-7)
2	Capture a clock dump and ensure all major clocks are aligned with the QTI clock plan in the document of the reference column. Clock dumps can be captured via JTAG, ADB command, or systrace. **Note:** When comparing device measurements with the QTI measurements, take into account hardware factors, e.g., display size, display type, and DDR, that may potentially impact graphics power consumption. File a case if your device configuration is different from QTI's reference device.	▪ *MSM8994 Windows Phone Modem/Multimedia Use Case Component-Level Power Breakdown and Clk Plan Details (*80-NM328-701) ▪ *MSM8994 Modem/Multimedia Use Case Details (*80-NM328-704) ▪ *MSM8936/MSM8939 Clock Plan (*80-NM846-3)
3	Check the following properties under the /system/build.prop file. Alternatively, use the adb getprop command as shown below. Modification of the two following parameters as compared to the QTI reference device can result in high current consumption. Composition type – adb shell getprop | grep debug.composition.type Composition bypass enable/disable – adb shell getprop | grep persist.hwc.mdpcomp	
4	Use the ADB command adb shell cat /proc/interrupts | grep kgsl to check the QTI Adreno Kernel Driver (KGSL) interrupts count. While running the use case, print it for multiple instances and get the difference.	
5	Check the number of hardware layers. While capturing dumpsys, ensure that none of the layers are being updated. If the status bar is being updated because of USB charging, the wrong information will be seen. To avoid this, run the command in the background after a device sleep of 10 to 15 sec using adb shell dumpsys SurfaceFlinger.	
6	GPU clock capture. Get the following data while running the use case with the following ADB command and compare it with QTI reference data. adb shell cat /sys/kernel/debug/clk/oxili_gfx3d_clk/measure	
7	Check each GPU parameter using the following ADB command, i.e., gpu_available_frequencies, idle_timer, gpubusy, gputop, gpu governor, etc. adb shell cat /sys/class/kgsl/kgsl-3d0/< parameters as mentioned above >	
8	Check and compare GPU power level under file chipsetname-gpu.dtsi. Modifying this can result in high GPU frequency, which can result in high power consumption.	
9	If power is still high, file a case and provide the debugging information (Top, SurfaceFlinger, systrace, clock dump)	

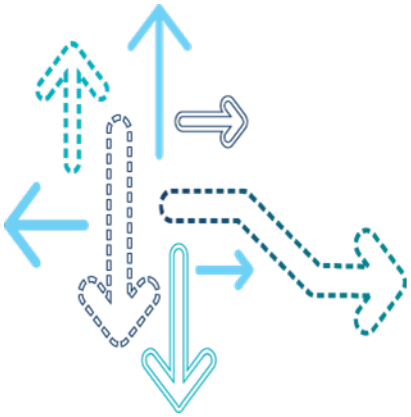
Static Image Use Case

No.	Step	Reference
1	Compare the power of your device with the QTI reference power data in the document of reference column.	▪ *MSM8994 Linux Android Current Consumption Data* (80-NJ051-7) ▪ *MSM8936/MSM8939 Linux Android Current Consumption Data* (80-NM683-7)
2	Check the following properties under the /system/build.prop file. Alternatively, use the adb getprop command as shown below. Modification of the two following parameters as compared to the QTI reference device can result in high current consumption. Composition type – adb shell getprop | grep debug.composition.type Composition bypass enable/disable – adb shell getprop | grep persist.hwc.mdpcomp	
3	Use the ADB command adb shell cat /proc/interrupts | grep kgsl to check the QTI Adreno Kernel Driver (KGSL) interrupts count. While running the use case, print it for multiple instances for a 10-sec period and get the difference. KGSL interrupts should not increase if the device is idle and there is no UI update.	
4	In the case of the static image display use case, check the number of layers and compare with QTI reference data. To check the number of hardware layers while capturing dumpsys SurfaceFlinger logs, ensure that none of the layers are being updated. adb shell dumpsys SurfaceFlinger	
5	If the static image display current consumption is still high after the above checks, this is due either to frequent wakeups or high baseline current. Check for both conditions.	
6	If frequent wakeups, frequent interrupts can prevent a device from going into idle power collapse. To debug this further, debug logs such as PowerTop, Top, msmpmstats, Ftrace, and interrupts are necessary.	
7	High base current. Baseline power can be high because of many reasons, e.g., the CPU not going to idle power collapse. To determine why baseline current is high, capture a clock dump and ensure all the major clocks are aligned with the reference clock plan. Capture the full breakdown and compare with the static image display use case breakdown in the document of reference column. Check whether a major power rail, e.g., CX, MX, DDR, or CPU, is consuming more current. Also, check MX and CX voltage level. Increased DDR/MX current consumption may be due to increased read/writes or to extra logging that is occurring in the background. You need to check xo shutdown and Vdd min also.	
8	If power is still high, file a case and provide the debugging information (Top, SurfaceFlinger, systrace, clock dump)	

Filing a Power Case

- If the suggested debugging methodologies and case studies do not resolve the issue, file a case with the following information:
  - Problem description
    - Details of the use case if different from QTI standard use case
    - Steps to reproduce the issue
  - All information about the debugging performed up until point of filing the case
    - Logs suggested in debugging:
      - Top
      - PowerTop
      - Rail level breakdown
      - Clock dump
      - SurfaceFlinger
      - Ftrace
      - Systrace
      - Waveforms
      - NPA dumps
      - Any other logs captured

Tuning Parameters

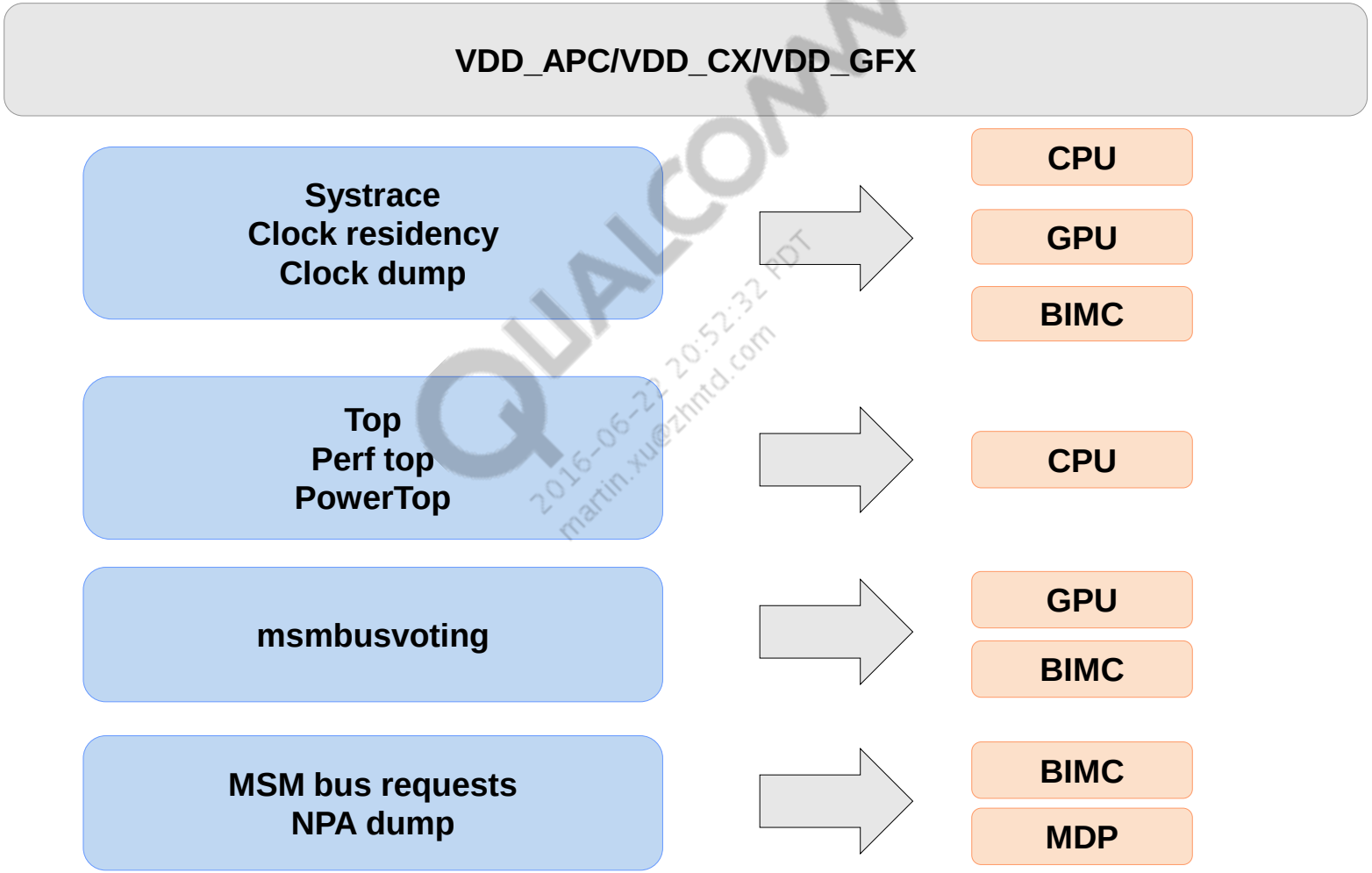


Locating Tuning Parameters

VDD_APC/VDD_CX/VDD_GFX

CPU	**Interactive governor parameters** **Thread migration parameters** ***above_hispeed_delay, go_hispeed_load, target_loads, timer_rate, hispeed_freq, scaling_min_freq, min_sample_time, sampling_down_factor, sync_threashold, io_percent***
GPU	**GPU init clock** **Idle timer**
MDP	**Fudge factor** **Mdpcomp.idletime**
BIMC	**BIMC min lock** **Static mapping with GPU clock and BIMC clock**

Tools for Analyzing Tuning Parameters



Tuning Parameters

System	Parameter	Example	Description	Impact
GPU	Init clock (Init level)	3 (300 MHz) 4 (240 MHz)	Initial clock of GPU /sys/class/kgsl/kgsl-3d0/default_pwrlevel (* not all chipsets support this sysfs node)	In dependent upon use case, can see power saving.
	Idle_timer	80 ms	Interval to go to Slumber state from Idle state /sys/class/kgsl/kgsl-3d0/idle_timer	In dependent upon use case, can see power saving. * Need performance and stability verification on this change.
BIMC	min_freq	1575	Minimum frequency of BIMC /sys/class/devfreq/0.qcom,cpubw/min_freq	Need performance verification on this change
MDP	Fudge_factor	AB 2 1 IB 6 5	Extra margin for MDP AB and IB voting /kernel/arch/arm/boot/dts/chipset-mdss.dtsi	Need to make sure MDP underrun with this change.
	debug.mdpcomp. idletime	70 ms	▪ This is valid only for Video mode panel ▪ This one will decide when to fallback to GPU composition from MDP composition in case there is no updated layer for composition ▪ adb shell setprop debug.mdpcomp.idletime 80	In general, the longer idle time will cause more power, and shorter idle time will impact performance degradation

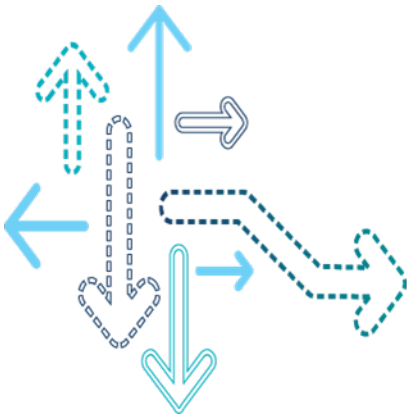
Tuning Parameters (cont.)

System	Parameter	Example	Description	Impact
CPU	above_hispeed_ delay	20000 1400000:40000 1700000:20000	This is a waiting time for specific frequency; uses delay 20 ms until 1.4 GHz, 40 ms between 1.4 GHz and 1.7 GHz, 20 ms above 1.7 GHz /sys/devices/system/cpu/cpufreq/interactive/ above_hispeed_delay	May impact performance. Performance verification is required on this change.
	go_hispeed_ load	90	The CPU load at which to jump to hispeed_freq /sys/devices/system/cpu/cpufreq/interactive/ go_hispeed_load	
	target_loads	85 1500000:90 1800000:95	We can adjust the load by CPU frequency; target CPU load is 85% below speed 1.5 GHz, target CPU load is 90% between 1.5 GHz and 1.8 GHz, target CPU load is 95% over 1.8 GHz /sys/devices/system/cpu/cpufreq/interactive/ target_loads	
	timer_rate	20000	This is sampling time; CPU load or frequency is calculated per every timer_rate /sys/devices/system/cpu/cpufreq/interactive/ timer_rate	
	tispeed_freq	1497600	When CPU load goes over go_hisped_load, CPU frequency will be set to hispeed_freq /sys/devices/system/cpu/cpufreq/interactive/ hispeed_freq	
	scaling_min_ freq	-1	Minimum frequency of CPU /sys/devices/system/cpu/cpufreq/interactive/ scaling_min_freq	

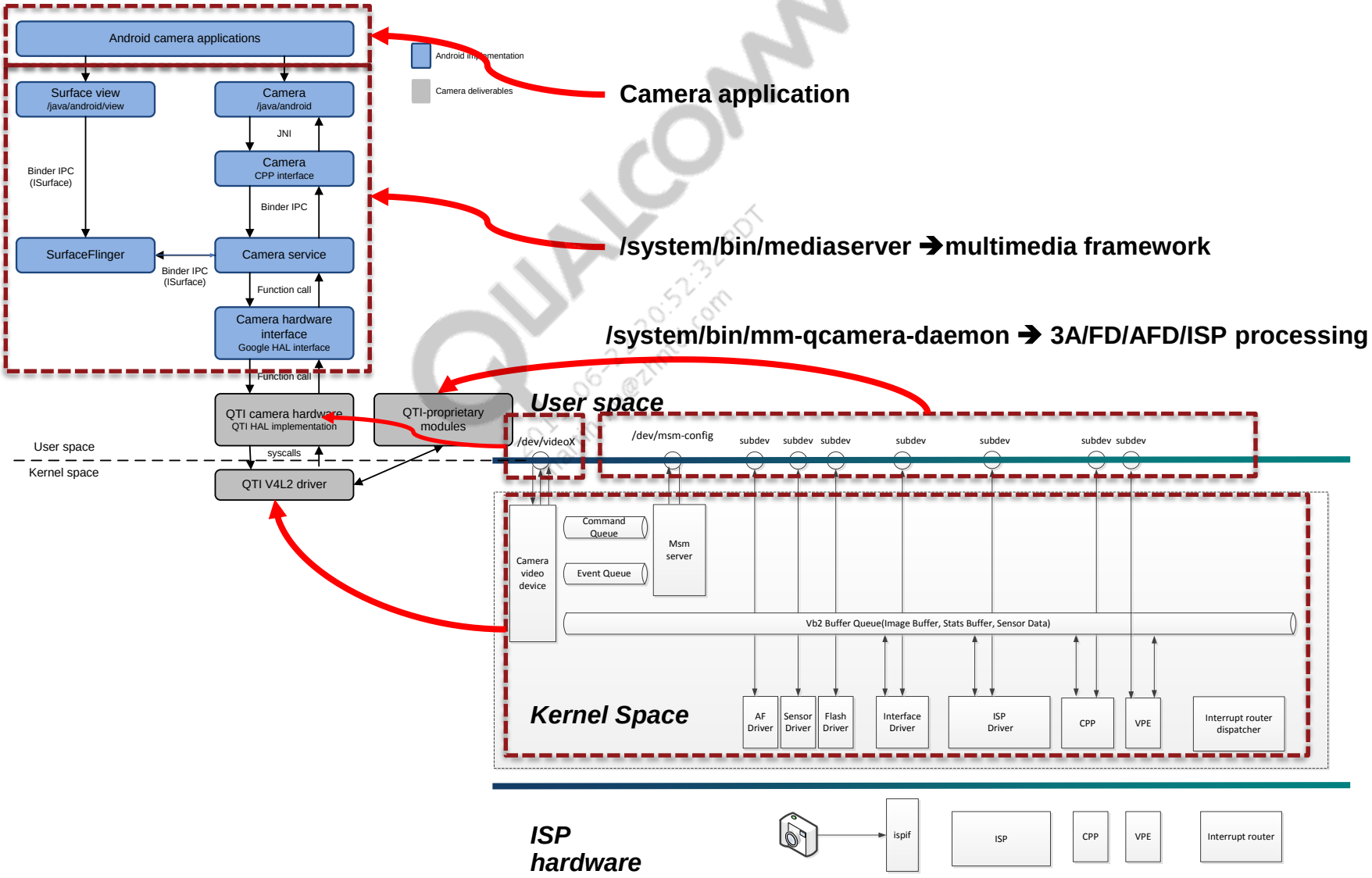
Tuning Parameters (cont.)

System	Parameter	Example	Description	Impact
CPU	min_sample_time	80000	The minimum amount of time to spend at the current frequency before ramping down /sys/devices/system/cpu/cpufreq/interactive/min_sample_time	May impact performance. Performance verification is required on this change.
	sampling_down_factor	100000	min_sample_time at max frequency /sys/devices/system/cpu/cpufreq/interactive/sampling_down_factor	
	sync_threashold	88300	sync_threshold determines the frequency of the destination core when a thread migrates from a source core to the destination core; if the source core frequency is higher than the sync_threshold, the destination core frequency will be ramped up to the sync_threshold frequency; if the source core frequency is lower than the sync_threshold, the destination core frequency will match the source core frequency /sys/module/cpu_boost/parameters/sync_threshold	
	Io_percent	16	The percentage of the CPU time that can be spent waiting on memory I/O /sys/class/devfreq/0.qcom,cpubw/cpubw_hwmon/io_percent	

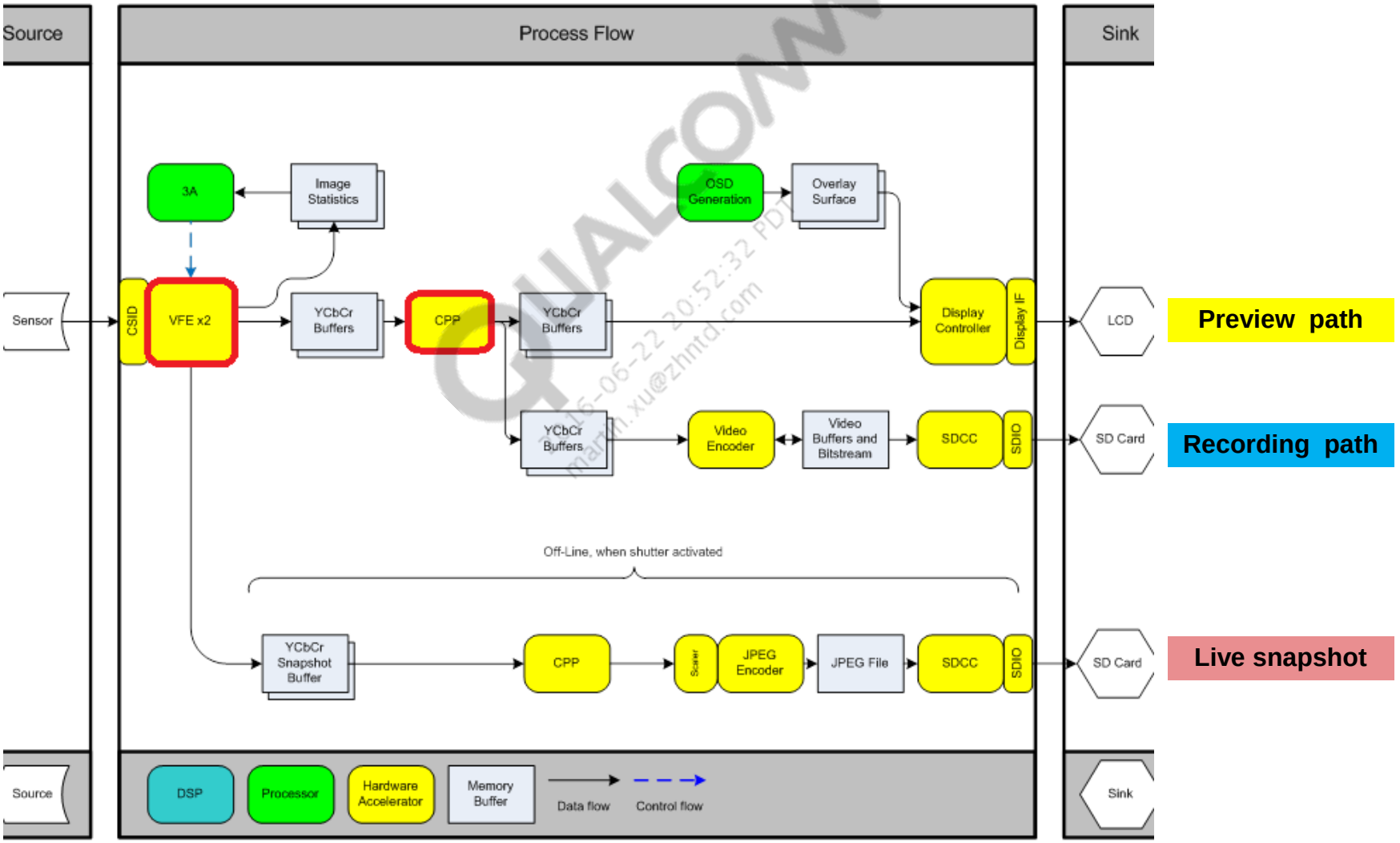
Camera Use Case



Camera Software Architecture – MSM8084



ISP Hardware and MSM8084 Camera Data Flow



Define Problem

Problem area	Modules	OEM dependency	Debugging tool kit
Camera app issue	OEM APK	OEM application	1. Check enabled-camera app options 2. TOP and PowerTOP analysis 3. CPU residency 4. SurfaceFlinger dump 5. Systrace analysis
Multimedia framework	mediaserver and OEM software codec (audio)	OEM can use their own software codec (audio)	1. TOP and PowerTOP analysis 2. CPU residency 3. SurfaceFlinger dump 4. Systrace analysis 5. SPV analysis
3A/ISP/AFD/FD issue	mm-qcamera-daemon and third-party algorithm library	OEM can use third-party algorithms	1. Check enabled-processing modules 2. TOP and PowerTOP analysis 3. CPU residency 4. Check hardware IRQ 5. Bus voting analysis 6. Perf analysis 7. Check DSP clock for FD
ISP hardware	QTIC ISP module/ kernel events and third-party external ISP	OEM can use third-party external ISP	1. Powertop-check HW IRQ @ 30 fps 2. Check hardware system clock 3. Ftrace analysis 4. Power rail breakdown

Case 1 – Camera Application Issue – Recording

- OEM camera application is using RGB format for their own image processing on every frame. In addition, YUV to RGB conversion should be done by GPU.

OEM using RGB format

```
Ctrl id=64 z=0 fg=0 alpha=255 mask=-1 flags=0x44200 H.Deci=0,V.Deci=0
      src w=1664 h=2560 format=13 MDP_RGBA_8888
      src_rect x=0 y=0 w=720 h=2560
      dst_rect x=0 y=0 w=720 h=2560
Data id=64
      data offset=0 memid=40 id=0 flags=0x0
Display=0
Ctrl id=128 z=0 fg=0 alpha=255 mask=-1 flags=0x44300 H.Deci=0,V.Deci=0
      src w=1440 h=2560 format=13 MDP_RGBA_8888
      src_rect x=720 y=0 w=720 h=2560
      dst_rect x=0 y=0 w=720 h=2560
Data id=128
      data offset=0 memid=40 id=0 flags=0x0
Display=0
Pipes=2
```

Normal case

```
Ctrl id=64 z=0 fg=0 alpha=255 mask=-1 flags=0x44200 H.Deci=0,V.Deci=0
      src w=1664 h=2560 format=13 MDP_RGBA_8888
      src_rect x=0 y=0 w=720 h=2560
      dst_rect x=0 y=0 w=720 h=2560
Data id=64
      data offset=0 memid=40 id=0 flags=0x0
Display=0
Ctrl id=128 z=0 fg=0 alpha=255 mask=-1 flags=0x44300 H.Deci=0,V.Deci=0
      src w=1440 h=2560 format=13 MDP_Y_CRCB_H2V
      src_rect x=720 y=0 w=720 h=2560
      dst_rect x=0 y=0 w=720 h=2560
Data id=128
      data offset=0 memid=40 id=0 flags=0x0
Display=0
Pipes=2
```


Case 1 – Camera Application Issue

- There are more GPU-related interrupts on customer device than MTP during camera scenario.

MTP

Top causes for wakeups:

41.0% (826.2)	<interrupt> : arch_timer
14.0% (289.5)	<interrupt> : cci
13.0% (262.3)	<interrupt> : qcom,smd-adsp
10.0% (199.4)	<interrupt> : arch_mem_timer
7.0% (138.2)	<interrupt> : vfe
5.0% (101.4)	<interrupt> : msm_vidc
3.0% (58.9)	<interrupt> : qcom,smd-rpm
3.0% (56.1)	<interrupt> : cpp
1.0% (29.2)	<interrupt> : MDSS
1.0% (27.5)	<interrupt> : ispif
1.0% (11.6)	<interrupt> : mmc0
1.0% (10.7)	<interrupt> : cpubw_hwmon
0.0% (3.6)	<interrupt> : kgsl-3d0

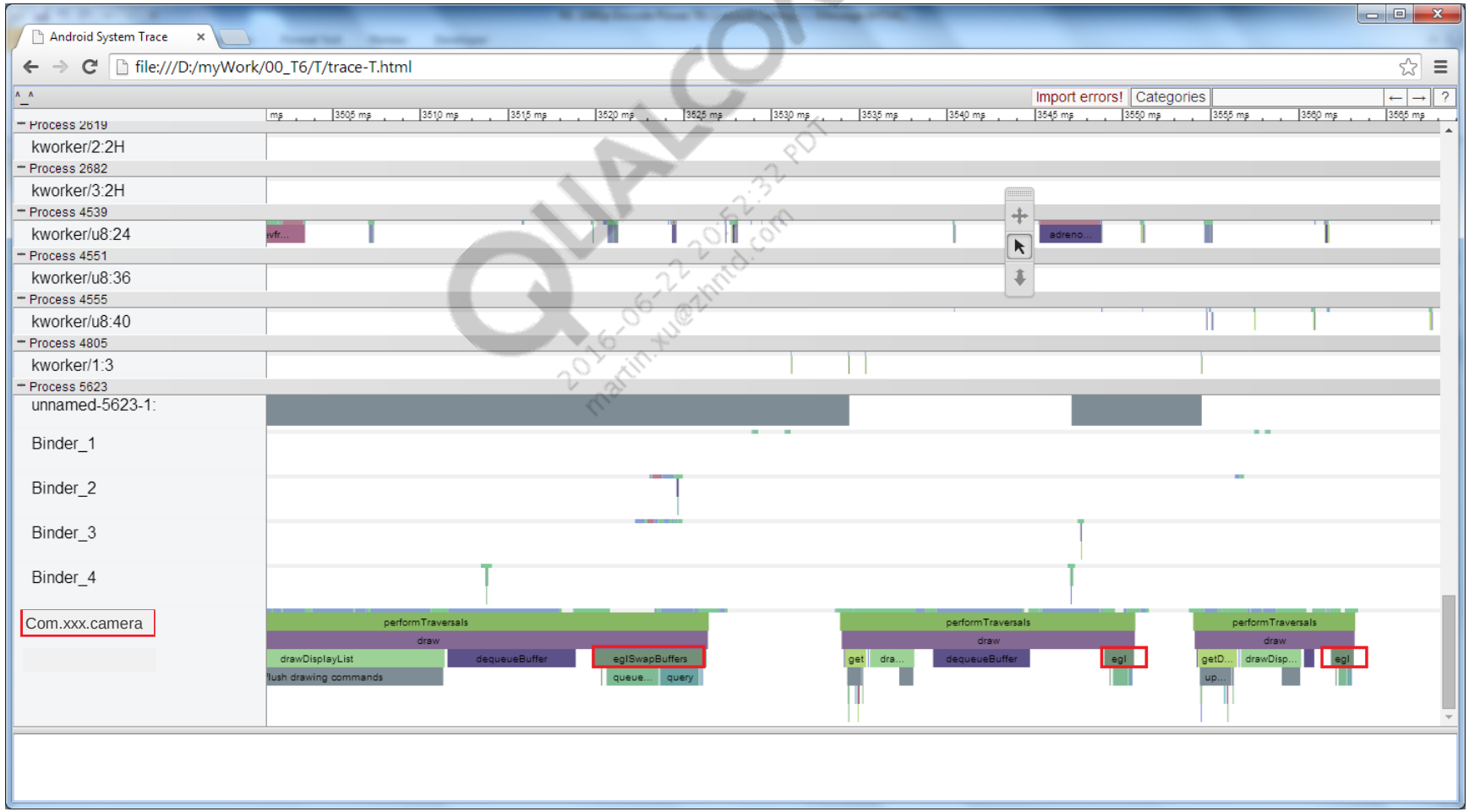
Customer device

Top causes for wakeups:

37.9% (764.4)	<interrupt> : arch_timer
14.9% (300.2)	<interrupt> : cci
14.1% (283.8)	<interrupt> : qcom,smd-adsp
10.4% (208.8)	<interrupt> : arch_mem_timer
6.1% (122.2)	<interrupt> : vfe
5.2% (103.8)	<interrupt> : msm_vidc
3.0% (60.2)	<interrupt> : qcom,smd-rpm
2.9% (58.8)	<interrupt> : cpp
1.6% (31.4)	<interrupt> : MDSS
1.5% (29.6)	<interrupt> : kgsl-3d0
1.5% (29.4)	<interrupt> : ispif
0.6% (11.6)	<interrupt> : cpubw_hwmon
0.5% (10.4)	<interrupt> : mmc0

Case 1 – Camera Application Issue (cont.)

- Com.xxx.camera is calling eglSwapBuffers on every frame.
- We expected to update timer area, but every frame is updated in RGB.



Case 2 – Camera 3A Algorithm Issue

- KRAIT power rail on Device B is more higher than Device A.
- We need to check KRAIT power rail.

	Device A	Input voltage	Input current	Vbat
AP	VDD_MEM	0.965	185.04	46.261
	VDD_EBI0_PLL	0.965	16.77	4.05
	VDD_CORE	0.933	814.78	190.0
	VDD_PLL1	0.933	58.04	13.54
	VDD_MIPI_CSI_1V8	1.799	6.13	2.76
	VDD_DDR_CORE_1P2	1.227	162.26	49.78
	KRAIT	0.842	247.04	52.00

	Device B	Input voltage	Input current	Vbat
AP	VDD_MEM	1.01	204.03	51.5176
	VDD_EBI0_PLL			
	VDD_CORE	1.03	760.98	195.01
	VDD_PLL1	1.79	34	15.22
	VDD_MIPI_CSI_1V8			
	VDD_DDR_CORE_1P2	1.22	171.26	52.38
	KRAIT	0.84	370.16	77.86

Case 2 – Camera 3A Algorithm Issue (cont.)

- Based on perf profiling information, mm-qcamera-daemon working heavily in Device B (over 10%) compared to Device A (5%) and AWB/AE working in the thread as shown below.

TOP profiling On Device A	PID TID PR CPU% S VSS RSS PCY UID Thread Proc 440 16055 0 5% S 161408K 10868K camera mm-qcamera-daem /system/bin/mm-qcamera-daemon 15413 15413 1 4% S 1094956K 111264K fg u0_a17 com.xxx.camera com.xxx.camera 440 15579 1 2% S 161408K 10868K camera mm-qcamera-daem /system/bin/mm-qcamera-daemon 294 16077 1 2% S 292112K 22440K fg media VideoEncMsgThre /system/bin/mediaserver 16124 16124 3 1% R 2016K 1172K root top top 290 290 1 1% S 174600K 11312K fg system surfaceflinger /system/bin/surfaceflinger 440 15458 0 1% S 161408K 10868K camera mm-qcamera-daem /system/bin/mm-qcamera-daemon 440 15581 0 1% S 161408K 10868K camera mm-qcamera-daem /system/bin/mm-qcamera-daemon 294 16062 0 0% S 292112K 22440K fg media Binder_2 /system/bin/mediaserver 1455 1458 3 0% S 3816K 584K media_rw sdcard /system/bin/sdcard 440 16056 0 0% S 161408K 10868K camera mm-qcamera-daem /system/bin/mm-qcamera-daemon 294 16064 2 0% S 292112K 22440K fg media Binder_2 /system/bin/mediaserver 429 691 0 0% S 30888K 1324K nobody sensors.qcom /system/bin/sensors.qcom
Perf analysis On Device A	PerfTop: 134 irqs/sec kernel:10.4% exact: 0.0% [1000Hz cycles], (target_tid: 16055) 17.68% libXXXisLib.so [.] __udivsi3 17.40% libXXXisLib.so [.] __udivsi3 13.21% libmmcamera2_stats_modules.so [.] ais_convert_stats_awb_data 12.54% libmmcamera2_stats_modules.so [.] ais_convert_stats_ae_data_gb 7.98% libXXXisLib.so [.] AlFixMul 5.06% libmmcamera2_stats_modules.so [.] backlight_detect_by_CTO 3.65% libmmcamera2_stats_modules.so [.] ais_process_core 2.52% libXXXisLib.so [.] 0x000137f4 2.23% libXXXisLib.so [.] __divdi3 2.17% [kernel] [k] _raw_spin_unlock_irqrestore 1.91% libmmcamera2_stats_modules.so [.] ais_resize_stats_awb_data 1.76% libc.so [.] __udivsi3 1.71% libmmcamera2_stats_modules.so [.] 0x00005ce2 1.25% libXXXisLib.so [.] XXXwbSetBlockLineStatistics 1.14% libc.so [.] __memcpy_base

Case 2 – Camera 3A Algorithm Issue (cont.)

TOP profiling on Device B

```
  PID   TID PR CPU% S    VSS     RSS PCY UID      Thread          Proc
  491 21404  0  10% S 397344K  85100K     camera   mm-qcamera-daem /system/bin/mm-qcamera-daemon
21711 21711  1   4% R   2124K   1160K     root     top             top
  491 21255  0   4% S 397344K  85100K     camera   mm-qcamera-daem /system/bin/mm-qcamera-daemon
 6313  6313  2   4% S 1101420K 114148K  fg u0_a16   com.xxx.camera  com.xxx.camera
  491 21286  3   3% S 397344K  85100K     camera   mm-qcamera-daem /system/bin/mm-qcamera-daemon
  491 21247  2   2% S 397344K  85100K     camera   mm-qcamera-daem /system/bin/mm-qcamera-daemon
  338 21411  3   1% S 439564K  20252K  fg media    mm_cam_poll_th  /system/bin/mediaserver
  334   334  2   1% S 156708K  10340K  fg system   surfaceflinger  /system/bin/surfaceflinger
  487   510  3   1% S   3848K    740K     media_rw sdcard          /system/bin/sdcard
  491 21241  3   1% S 397344K  85100K     camera   mm-qcamera-daem /system/bin/mm-qcamera-daemon
  487   509  3   1% S   3848K    740K     media_rw sdcard          /system/bin/sdcard
  574   627  0   0% S  40180K   1364K     nobody   sensors.qcom    /system/bin/sensors.qcom
  338 21413  3   0% S 439564K  20252K  fg media    Binder_3        /system/bin/mediaserver
  338 21412  3   0% S 439564K  20252K  fg media    Binder_3        /system/bin/mediaserver
 4545  4545  2   0% S   1884K   1208K  bg system   logcat          logcat
12280 12280  2   0% S      0K      0K     root     kworker/u8:24
```

Perf analysis on Device B

```
PerfTop:    306 irqs/sec  kernel: 5.9%  exact:  0.0% [1000Hz cycles],  (target_tid: 21404)
   24.95%  libmmcamera2_stats_algorithm.so  [.] 0x0001908c
   24.77%  libmmcamera2_stats_algorithm.so  [.] 0x0001908c
   21.82%  libc.so                          [.] __udivsi3
   11.08%  libmmcamera2_stats_algorithm.so  [.] awb_bayer_algo_execute
   10.91%  libmmcamera2_stats_algorithm.so  [.] aec_process
    3.39%  libc.so                          [.] __memcpy_base
    3.14%  libmmcamera2_stats_algorithm.so  [.] awb_bayer_illuminant_probability
    3.08%  libc.so                          [.] __udivdi3
    1.95%  [kernel]                         [k] _raw_spin_unlock_irqrestore
    1.56%  libc.so                          [.] __aeabi_uidivmod
    1.49%  libc.so                          [.] 0x00029ac2
    1.20%  libmmcamera2_stats_algorithm.so  [.] awb_process_pack_output
    1.12%  libc.so                          [.] __vfprintf
```

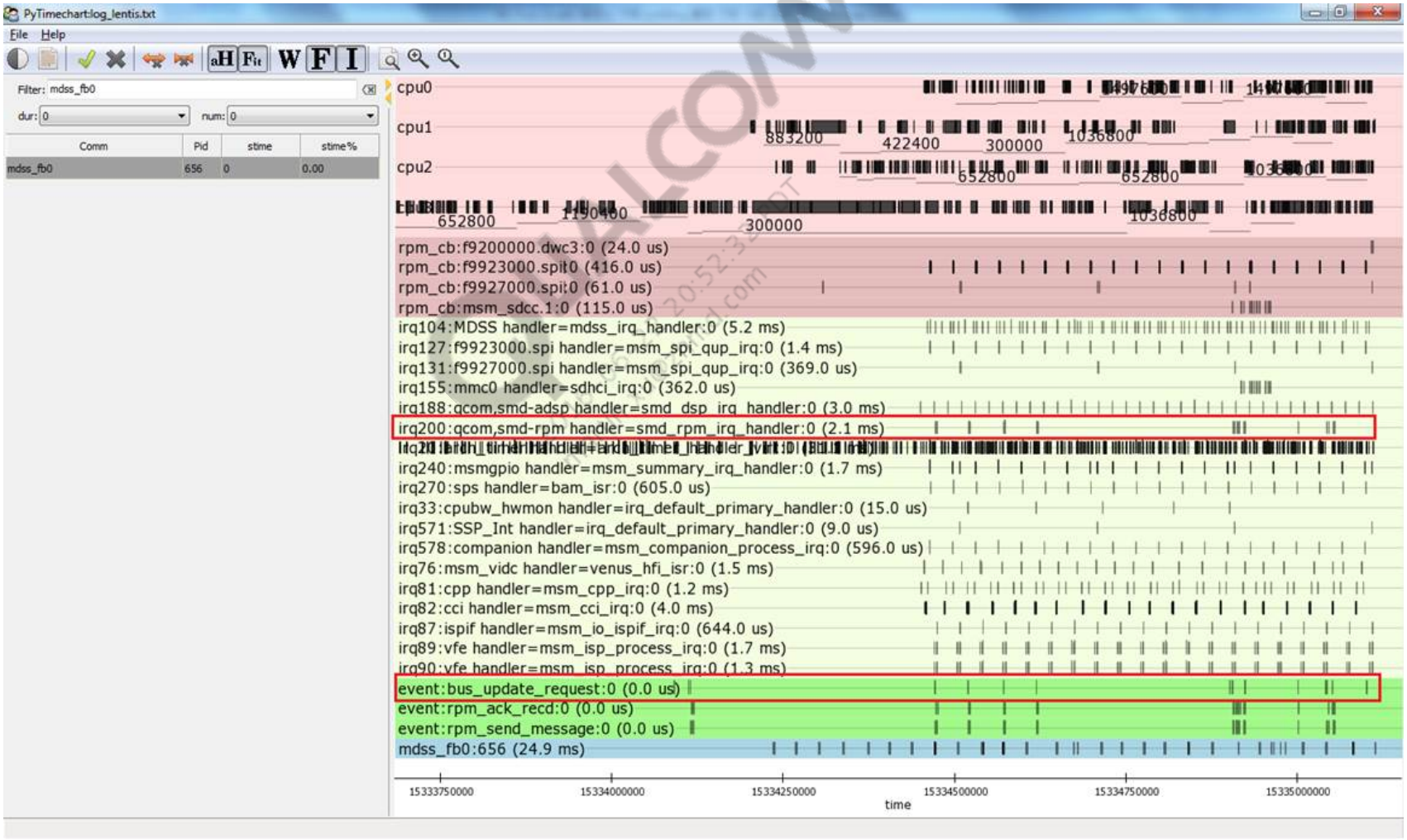
Case 3 – MDP Bus Voting Issue

- TOP/PowerTOP analysis, Krait CPU clock speed in Device B seem to be higher than Device A and qcom,smd-rpm event happens more frequently in Device B.

	Device A	Device B
PowerTOP P-states (frequencies)	300 Mhz 0.0% 32.9% 43.7% 32.5% 422 Mhz 7.1% 18.7% 20.7% 18.3% 653 Mhz 36.0% 32.9% 14.8% 23.0% 730 Mhz 18.9% 2.0% 3.0% 4.9% 883 Mhz 19.1% 3.0% 0.0% 3.0% 960 Mhz 2.4% 0.0% 1.2% 1.2% 1037 Mhz 12.4% 10.6% 9.6% 13.6% 1190 Mhz 3.0% 0.0% 3.0% 1.2% 1267 Mhz 1.2% 0.0% 1.8% 0.0% 1498 Mhz 0.0% 0.0% 2.4% 2.4% 1.58 Ghz 0.0% 0.0% 0.0% 0.0% 1.73 Ghz 0.0% 0.0% 0.0% 0.0% 1.96 Ghz 0.0% 0.0% 0.0% 0.0% 2.27 Ghz 0.0% 0.0% 0.0% 0.0% 2.46 Ghz 0.0% 0.0% 0.0% 0.0%	300 Mhz 0.0% 13.6% 30.6% 33.0% 422 Mhz 0.0% 22.6% 13.0% 10.8% 653 Mhz 14.7% 36.0% 26.5% 25.5% 730 Mhz 11.0% 5.3% 3.5% 1.2% 883 Mhz 41.8% 2.4% 6.5% 1.2% 960 Mhz 11.8% 1.2% 0.0% 4.7% 1037 Mhz 17.1% 12.6% 13.2% 13.0% 1190 Mhz 3.5% 2.9% 1.8% 1.2% 1267 Mhz 0.0% 2.4% 1.2% 4.7% 1498 Mhz 0.0% 1.2% 3.7% 4.7% 1.58 Ghz 0.0% 0.0% 0.0% 0.0% 1.73 Ghz 0.0% 0.0% 0.0% 0.0% 1.96 Ghz 0.0% 0.0% 0.0% 0.0% 2.27 Ghz 0.0% 0.0% 0.0% 0.0% 2.46 Ghz 0.0% 0.0% 0.0% 0.0%
PowerTOP Top causes for wakeups	47.9% (1061.4) <interrupt> : arch_timer 9.3% (206.2) <interrupt> : vfe 8.1% (180.0) <interrupt> : cci 5.5% (121.6) <interrupt> : MDSS 5.3% (118.4) <interrupt> : msm_vidc 4.9% (108.6) <interrupt> : arch_mem_timer 4.1% (90.0) <interrupt> : f9923000.spi 2.7% (60.0) <interrupt> : cpp 2.3% (50.0) <interrupt> : qcom,smd-adsp 2.0% (44.6) <interrupt> : qcom,smd-rpm 1.6% (35.0) <interrupt> : msmgpio 1.4% (30.0) <interrupt> : companion 1.4% (30.0) <interrupt> : sps 1.3% (29.8) <interrupt> : ispif 0.9% (19.6) <interrupt> : mmc0 0.5% (10.6) <interrupt> : f9927000.spi 0.4% (8.8) <interrupt> : cpubw_hwmon 0.2% (5.2) <interrupt> : kgsl-3d0 0.2% (5.0) <interrupt> : SSP_Int	47.9% (1111.8) <interrupt> : arch_timer 8.9% (206.2) <interrupt> : vfe 7.8% (180.2) <interrupt> : cci 5.5% (126.8) <interrupt> : qcom,smd-rpm 5.3% (122.2) <interrupt> : MDSS 4.8% (110.4) <interrupt> : msm_vidc 4.6% (106.0) <interrupt> : arch_mem_timer 3.9% (90.6) <interrupt> : f9923000.spi 2.6% (60.2) <interrupt> : cpp 2.2% (50.4) <interrupt> : qcom,smd-adsp 1.5% (35.2) <interrupt> : msmgpio 1.3% (30.2) <interrupt> : companion 1.3% (30.2) <interrupt> : sps 1.3% (30.2) <interrupt> : ispif 0.5% (11.0) <interrupt> : f9927000.spi 0.3% (6.8) <interrupt> : cpubw_hwmon 0.2% (5.2) <interrupt> : kgsl-3d0 0.2% (5.2) <interrupt> : SSP_Int 0.1% (2.6) <interrupt> : mmc0

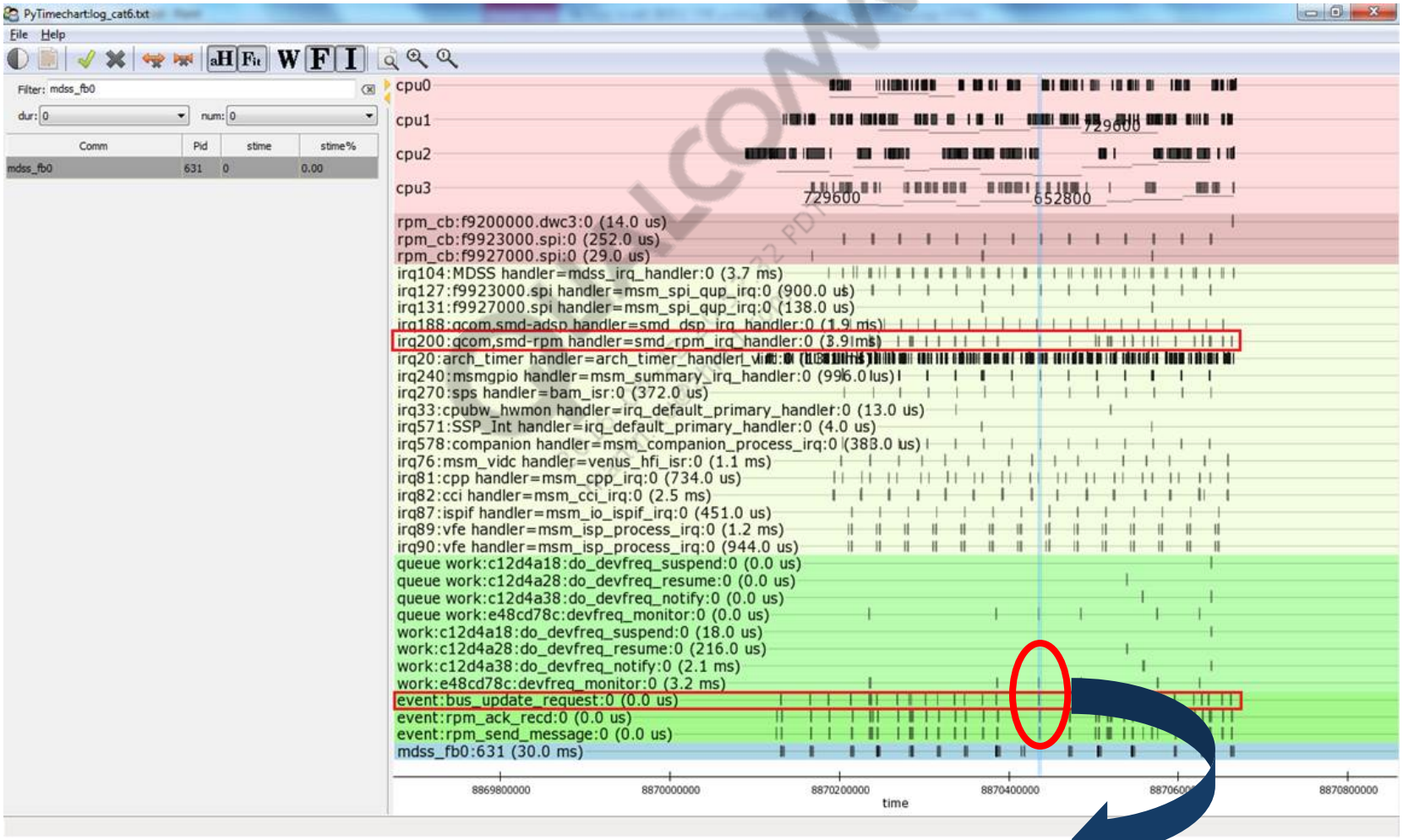
Case 3 – MDP Bus Voting Issue (cont.)

- Ftrace analysis of Device A



Case 3 – MDP Bus Voting Issue (cont.)

- Ftrace analysis of Device B




```
kworker/0:1-18236 [000] ...1  8870.435425: bus_update_request: time= 8870.400527553 name=mdss_mdp index=1 src=22 dest=512 ab=373248000 ib=373248000
kworker/0:1-18236 [000] ...1  8870.435428: bus_update_request: time= 8870.400527553 name=mdss_mdp index=1 src=23 dest=512 ab=373248000 ib=373248000
```

Case 3 – MDP Bus Voting Issue (cont.)

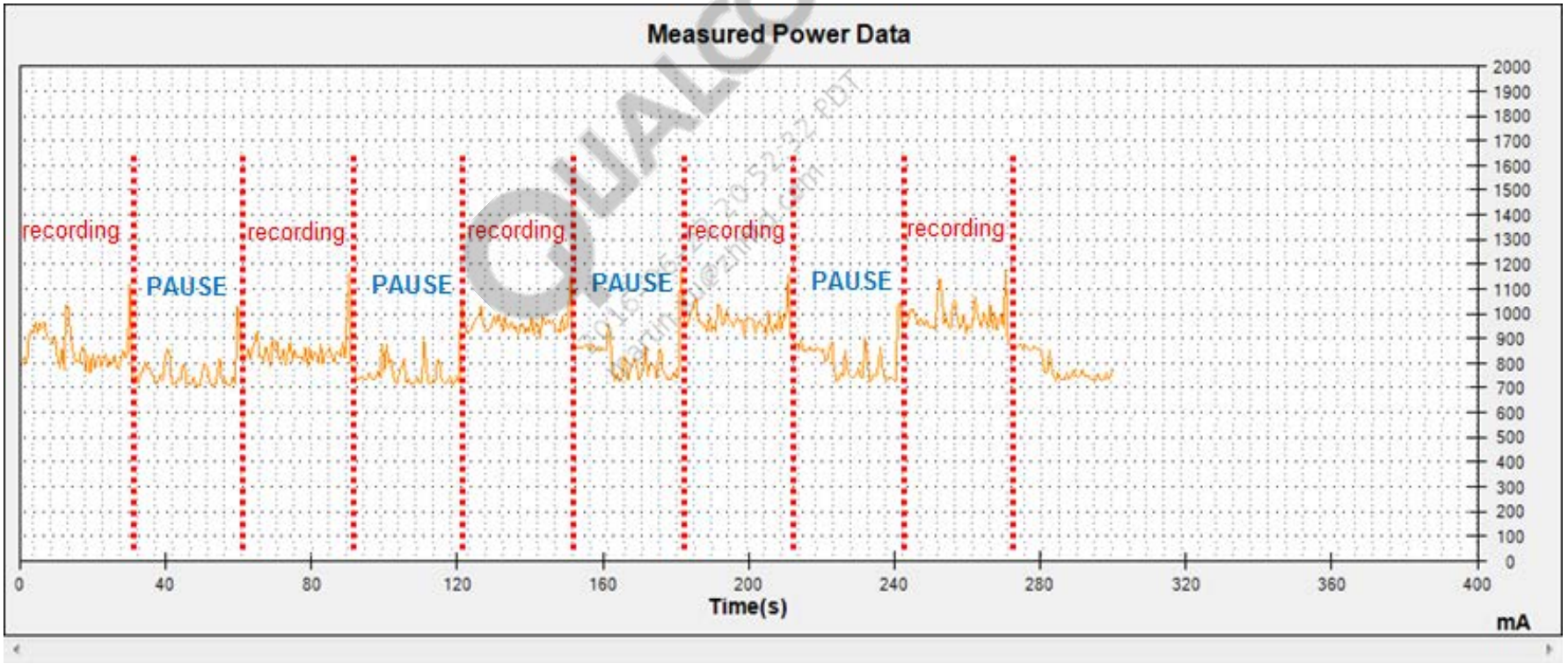
- MDSS bus voting during camera preview/video decording, mdss_mdp bus voting value frequently changes only in Device B

Device B – Camera Preview

devfreq_cpubw(masters/slaves/ab/ib)	mdss_mdp(masters/slaves/ab/ib)
1 / 512 / 597688320 / 3199205376	22 23 / 512 512 / 597900960 597900960 / 597900960 597900960
1 / 512 / 398458880 / 1599078400	22 23 / 512 512 / 597900960 597900960 / 597900960 597900960
1 / 512 / 398458880 / 1599078400	22 23 / 512 512 / 373248000 373248000 / 373248000 373248000
1 / 512 / 398458880 / 2399141888	22 23 / 512 512 / 373248000 373248000 / 373248000 373248000
1 / 512 / 199229440 / 1199570944	22 23 / 512 512 / 597900960 597900960 / 597900960 597900960
1 / 512 / 398458880 / 2399141888	22 23 / 512 512 / 597900960 597900960 / 597900960 597900960
1 / 512 / 398458880 / 1599078400	22 23 / 512 512 / 373248000 373248000 / 373248000 373248000
1 / 512 / 398458880 / 2399141888	22 23 / 512 512 / 597900960 597900960 / 597900960 597900960
1 / 512 / 199229440 / 1599078400	22 23 / 512 512 / 373248000 373248000 / 373248000 373248000
1 / 512 / 199229440 / 1199570944	22 23 / 512 512 / 597900960 597900960 / 597900960 597900960
1 / 512 / 398458880 / 1599078400	22 23 / 512 512 / 597900960 597900960 / 597900960 597900960
1 / 512 / 398458880 / 1599078400	22 23 / 512 512 / 373248000 373248000 / 373248000 373248000
1 / 512 / 199229440 / 1599078400	22 23 / 512 512 / 597900960 597900960 / 597900960 597900960
1 / 512 / 398458880 / 2399141888	22 23 / 512 512 / 597900960 597900960 / 597900960 597900960
1 / 512 / 199229440 / 1599078400	22 23 / 512 512 / 373248000 373248000 / 373248000 373248000
1 / 512 / 398458880 / 2399141888	22 23 / 512 512 / 597900960 597900960 / 597900960 597900960

Case 4 – Venus Bus Voting Issue

- Camera recording current increased by around 100 mA
- TEST scenario – 1080p single 16 M rear camera Recording→Pause→Recording (Resume)



Case 4 – Venus Bus Voting Issue (cont.)

- We can see venc-ocmem is voting higher and it makes higher mmssnoc clock (Turbo level).

Scenario	Profiling information
Start camera preview	CPU0 | CPU1 | CPU2 | CPU3 | bimc |mmss_mmssnoc_axi |venus0_vcodec0 |oxili_gfx3d |msm_camera_isp(masters/slaves/ab/ib) |venc-ocmem(masters/slaves/ab/ib) | 2457600 |2457600 |2457600 |2457600 |825600036 | 150001254 | 0 | 300002398 | 29 / 512 / 450000000 / 675000000 | 68 / 604 / 0 / 0 | 652800 |1190400 | 300000 | 883200 |825596887 | 333428640 | 0 | 0 | 29 / 512 / 3728813024 / 5209219536 | 68 / 604 / 0 / 0 | 1497600 | 300000 |1190400 | 729600 |825596887 | 333429885 | 0 | 0 | 29 / 512 / 3728813024 / 5209219536 | 68 / 604 / 0 / 0 | 652800 |1190400 | 300000 | 652800 |825606261 | 333429959 | 0 | 0 | 29 / 512 / 3728813024 / 5209219536 | 68 / 604 / 0 / 0 | 652800 |1190400 | 652800 | 652800 |384002966 | 333429885 | 0 | 0 | 29 / 512 / 3728813024 / 5209219536 | 68 / 604 / 0 / 0 | 652800 | 652800 |1497600 | 652800 |383998571 | 333427395 | 0 | 0 | 29 / 512 / 3728813024 / 5209219536 | 68 / 604 / 0 / 0 | 652800 | 652800 | 652800 | 652800 |460798278 | 333429885 | 0 | 0 | 29 / 512 / 3728813024 / 5209219536 | 68 / 604 / 0 / 0 | 652800 | 729600 | 652800 | 652800 |384000036 | 333427322 | 0 | 0 | 29 / 512 / 3728813024 / 5209219536 | 68 / 604 / 0 / 0 | 2457600 |2457600 |2457600 |2457600 |691199963 | 150001254 | 0 | 0 | 29 / 512 / 450000000 / 675000000 | 68 / 604 / 0 / 0 |
Start first camera recording then pause	CPU0 | CPU1 | CPU2 | CPU3 | bimc |mmss_mmssnoc_axi |venus0_vcodec0 |oxili_gfx3d |msm_camera_isp(masters/slaves/ab/ib) | venc-ocmem(masters/slaves/ab/ib) | 2457600 |2457600 |2457600 |2457600 | 307198938 | 333429959 | 133333394 | 75000718 | 29 / 512 / 2860000000 / 3906000000 |68 / 604 / 940000000 / 1034000000 | 729600 | 422400 |1036800 |1036800 |384001501 | 333429885 | 0 | 240000109 | 29 / 512 / 2860000000 / 3906000000 |68 / 604 / 940000000 / 1034000000 | 729600 | 652800 | 422400 | 300000 |307201281 | 333428640 | 133333467 | 75000425 | 29 / 512 / 2860000000 / 3906000000 |68 / 604 / 940000000 / 1034000000 | 1190400 | 422400 |1497600 | 652800 |307202453 | 333431204 | 133333467 | 75000132 | 29 / 512 / 2860000000 / 3906000000 |68 / 604 / 940000000 / 1034000000 | 652800 | 300000 |1036800 | 652800 |307202453 | 333429885 | 133334419 | 75000645 | 29 / 512 / 2860000000 / 3906000000 |68 / 604 / 940000000 / 1034000000 | 652800 | 422400 | 652800 | 422400 |307198938 | 333431204 | 0 | 75000132 | 29 / 512 / 2860000000 / 3906000000 |68 / 604 / 940000000 / 1034000000 | 1036800 | 652800 | 422400 |1036800 |307202307 | 333427322 | 133334492 | 75000425 | 29 / 512 / 2860000000 / 3906000000 |68 / 604 / 940000000 / 1034000000 | 1497600 | 652800 |1497600 |1497600 |307198864 | 333428640 | 133333907 | 75000718 | 29 / 512 / 2860000000 / 3906000000 |68 / 604 / 940000000 / 1034000000 | 652800 |1036800 |1036800 | 422400 |307200109 | 333428640 | 133332881 | 75000132 | 29 / 512 / 2860000000 / 3906000000 |68 / 604 / 940000000 / 1034000000 | 1190400 | 422400 |1036800 | 300000 |307200036 | 333431204 | 133333394 | 299998956 | 29 / 512 / 2860000000 / 3906000000 |68 / 604 / 940000000 / 1034000000 | 729600 |1036800 | 300000 | 652800 |307202380 | 333429885 | 133333467 | 75000645 | 29 / 512 / 2860000000 / 3906000000 |68 / 604 / 940000000 / 1034000000 | 1497600 | 422400 | 960000 | 300000 |307201281 | 333428567 | 133332881 | 299998883 | 29 / 512 / 2860000000 / 3906000000 |68 / 604 / 940000000 / 1034000000 | 652800 | 422400 | 300000 |1036800 |307198938 | 333428640 | 133333394 | 74999766 | 29 / 512 / 2860000000 / 3906000000 |68 / 604 / 940000000 / 1034000000 | 652800 |1036800 | 422400 | 652800 |307201208 | 333429885 | 133332954 | 75000645 | 29 / 512 / 2860000000 / 3906000000 |68 / 604 / 940000000 / 1034000000 | 1267200 |1267200 |1267200 |1267200 |691197326 | 333427322 | 0 | 239999157 | 29 / 512 / 2860000000 / 3906000000 |68 / 604 / 940000000 / 1034000000 | 652800 | 300000 | 300000 | 300000 |307198938 | 333428640 | 0 | 75000718 | 29 / 512 / 2860000000 / 3906000000 |68 / 604 / 940000000 / 1034000000 | 883200 |1036800 |1036800 | 422400 |307198938 | 333431204 | 0 | 75000059 | 29 / 512 / 2860000000 / 3906000000 |68 / 604 / 940000000 / 1034000000 | 652800 | 729600 | 300000 |1036800 |307198938 | 333428567 | 0 | 75000132 | 29 / 512 / 2860000000 / 3906000000 |68 / 604 / 940000000 / 1034000000 | 1036800 |1497600 | 300000 |1036800 |307200109 | 333428640 | 0 | 75000645 | 29 / 512 / 2860000000 / 3906000000 |68 / 604 / 940000000 / 1034000000 | 652800 | 300000 | 422400 | 300000 |307202453 | 333427322 | 0 | 75000718 | 29 / 512 / 2860000000 / 3906000000 |68 / 604 / 940000000 / 1034000000 | 960000 | 422400 | 300000 | 300000 |307198938 | 333431204 | 0 | 74999839 | 29 / 512 / 2860000000 / 3906000000 |68 / 604 / 940000000 / 1034000000 | 1036800 | 300000 |1036800 | 300000 |307198938 | 333427395 | 0 | 19200183 | 29 / 512 / 2860000000 / 3906000000 | 68 / 604 / 0 / 0 | 652800 | 652800 | 422400 | 300000 |307198938 | 333431204 | 0 | 19200256 | 29 / 512 / 2860000000 / 3906000000 | 68 / 604 / 0 / 0 | 1036800 |1036800 | 300000 | 300000 |307200036 | 333427322 | 0 | 19200256 | 29 / 512 / 2860000000 / 3906000000 | 68 / 604 / 0 / 0 | 652800 | 300000 | 422400 |1036800 |307198938 | 333427322 | 0 | 19200036 | 29 / 512 / 2860000000 / 3906000000 | 68 / 604 / 0 / 0 | 883200 | 422400 | 652800 |1190400 |307201281 | 333431130 | 0 | 300002398 | 29 / 512 / 2860000000 / 3906000000 | 68 / 604 / 0 / 0 | 652800 |1036800 | 422400 | 300000 |307200109 | 333427395 | 0 | 19200036 | 29 / 512 / 2860000000 / 3906000000 | 68 / 604 / 0 / 0 | 652800 | 652800 | 300000 | 300000 |307202380 | 333428640 | 0 | 19200256 | 29 / 512 / 2860000000 / 3906000000 | 68 / 604 / 0 / 0 | 652800 |1036800 |1036800 | 300000 |307201208 | 333427395 | 0 | 19200183 | 29 / 512 / 2860000000 / 3906000000 | 68 / 604 / 0 / 0 | 652800 | 422400 | 300000 | 422400 |307200109 | 333431130 | 0 | 19200256 | 29 / 512 / 2860000000 / 3906000000 | 68 / 604 / 0 / 0 | 652800 | 422400 | 300000 | 300000 |307201208 | 333427395 | 0 | 19200256 | 29 / 512 / 2860000000 / 3906000000 | 68 / 604 / 0 / 0 | 652800 | 300000 | 300000 | 300000 |307201281 | 333429885 | 0 | 19200109 | 29 / 512 / 2860000000 / 3906000000 | 68 / 604 / 0 / 0 | 652800 |1036800 | 300000 | 300000 |307200036 | 333427322 | 0 | 19200109 | 29 / 512 / 2860000000 / 3906000000 | 68 / 604 / 0 / 0 |

Case 4 – Venus Bus Voting Issue (cont.)

- Venus bus voting algorithm was changed properly when client votes.

Scenario	Profiling information
Second camera recording then pause	CPU0 | CPU1 | CPU2 | CPU3 | bimc |mmss_mmssnoc_axi |venus0_vcodec0 |oxili_gfx3d |msm_camera_isp(masters/slaves/ab/ib) | venc-ocmem(masters/slaves/ab/ib) | --- 1497600 | 300000 |1036800 | 422400 | 383998571 | 333429885 | 133333907 | 200000805 | 29 / 512 / 2860000000 / 3906000000 |68 / 604 / 1880000000 / 2068000000 | 729600 | 422400 |1036800 |1497600 |384001501 | 333427395 | 133334419 | 200001611 | 29 / 512 / 2860000000 / 3906000000 |68 / 604 / 1880000000 / 2068000000 | 652800 |1036800 |1190400 | 729600 |383998645 | 333431204 | 133333467 | 200000073 | 29 / 512 / 2860000000 / 3906000000 |68 / 604 / 1880000000 / 2068000000 | 1190400 |1036800 | 300000 | 300000 |384002966 | 333431204 | 133334419 | 200000878 | 29 / 512 / 2860000000 / 3906000000 |68 / 604 / 1880000000 / 2068000000 | 652800 | 652800 |1036800 | 300000 |384001501 | 333431130 | 133334492 | 199999340 | 29 / 512 / 2860000000 / 3906000000 |68 / 604 / 1880000000 / 2068000000 | 729600 | 300000 | 652800 | 300000 |384000036 | 333427395 | 133333467 | 200000073 | 29 / 512 / 2860000000 / 3906000000 |68 / 604 / 1880000000 / 2068000000 | 652800 | 652800 | 300000 | 300000 |384001501 | 333427322 | 133333907 | 200000878 | 29 / 512 / 2860000000 / 3906000000 |68 / 604 / 1880000000 / 2068000000 | 1190400 |1267200 | 652800 |1036800 |384000036 | 333431204 | 133334419 | 300002398 | 29 / 512 / 2860000000 / 3906000000 |68 / 604 / 1880000000 / 2068000000 | 729600 |1036800 | 422400 | 422400 |384002966 | 333427395 | 0 | 300000054 | 29 / 512 / 2860000000 / 3906000000 |68 / 604 / 1880000000 / 2068000000 | 1036800 |1036800 | 652800 | 422400 |384002966 | 333431130 | 133333907 | 300000054 | 29 / 512 / 2860000000 / 3906000000 |68 / 604 / 1880000000 / 2068000000 | 1190400 | 422400 |1036800 | 300000 |384001501 | 333429959 | 0 | 200001611 | 29 / 512 / 2860000000 / 3906000000 |68 / 604 / 1880000000 / 2068000000 | 960000 |1036800 |1036800 | 300000 |383998571 | 333428640 | 133333907 | 199999340 | 29 / 512 / 2860000000 / 3906000000 |68 / 604 / 1880000000 / 2068000000 | 652800 | 652800 |1497600 | 422400 |384002966 | 333431204 | 0 | 200001611 | 29 / 512 / 2860000000 / 3906000000 |68 / 604 / 1880000000 / 2068000000 | 652800 | 883200 | 422400 | 652800 |384002966 | 333429885 | 133332881 | 199999340 | 29 / 512 / 2860000000 / 3906000000 |68 / 604 / 1880000000 / 2068000000 | 652800 | 422400 | 422400 | 652800 |383998571 | 333429959 | 0 | 200000878 | 29 / 512 / 2860000000 / 3906000000 |68 / 604 / 1880000000 / 2068000000 | 729600 |1036800 | 300000 |1728000 |691205236 | 333429885 | 0 | 299998883 | 29 / 512 / 2860000000 / 3906000000 |68 / 604 / 1880000000 / 2068000000 | 1036800 | 300000 | 300000 | 300000 |384001501 | 333431130 | 0 | 200000805 | 29 / 512 / 2860000000 / 3906000000 |68 / 604 / 1880000000 / 2068000000 | 729600 | 422400 | 300000 | 300000 |384001501 | 333429885 | 0 | 200000073 | 29 / 512 / 2860000000 / 3906000000 |68 / 604 / 1880000000 / 2068000000 | 1036800 | 300000 | 300000 | 300000 |384002966 | 333431204 | 0 | 199999267 | 29 / 512 / 2860000000 / 3906000000 |68 / 604 / 1880000000 / 2068000000 | 652800 | 300000 |1036800 | 300000 |383998571 | 333429885 | 0 | 200001611 | 29 / 512 / 2860000000 / 3906000000 |68 / 604 / 1880000000 / 2068000000 | 1036800 | 300000 | 300000 | 300000 |383998571 | 333428640 | 0 | 200000878 | 29 / 512 / 2860000000 / 3906000000 |68 / 604 / 1880000000 / 2068000000 | 652800 | 300000 |1497600 |1036800 |384000036 | 333429885 | 0 | 200000805 | 29 / 512 / 2860000000 / 3906000000 |68 / 604 / 1880000000 / 2068000000 | 729600 | 300000 |1036800 | 300000 |384001501 | 333427322 | 0 | 200000878 | 29 / 512 / 2860000000 / 3906000000 |68 / 604 / 1880000000 / 2068000000 | 1267200 |1036800 | 652800 | 300000 |384000036 | 333431204 | 0 | 200000878 | 29 / 512 / 2860000000 / 3906000000 |68 / 604 / 1880000000 / 2068000000 | 652800 | 652800 | 300000 |1036800 |307201281 | 333431204 | 0 | 19200183 | 29 / 512 / 2860000000 / 3906000000 | 68 / 604 / 0 / 0 | 652800 | 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3906000000 | 68 / 604 / 0 / 0 | 1036800 |1036800 |1036800 | 300000 |307200036 | 333428640 | 0 | 19200036 | 29 / 512 / 2860000000 / 3906000000 | 68 / 604 / 0 / 0 |
Third camera recording	CPU0 | CPU1 | CPU2 | CPU3 | bimc |mmss_mmssnoc_axi |venus0_vcodec0 |oxili_gfx3d |msm_camera_isp(masters/slaves/ab/ib) | venc-ocmem(masters/slaves/ab/ib) | --- 652800 | 422400 | 300000 |1036800 |460798278 | 399998498 | 133332954 | 299998883 | 29 / 512 / 2860000000 / 3906000000 |68 / 604 / 4468000000 / 2457000000 | 729600 |1497600 | 422400 | 652800 |460803552 | 400000036 | 133332881 | 200001611 | 29 / 512 / 2860000000 / 3906000000 |68 / 604 / 4468000000 / 2457000000 | 652800 |1036800 |1036800 | 422400 |460798278 | 400001574 | 133333980 | 200000878 | 29 / 512 / 2860000000 / 3906000000 |68 / 604 / 4468000000 / 2457000000 | 652800 | 300000 | 652800 | 300000 |460803552 | 400003112 | 133333907 | 199999267 | 29 / 512 / 2860000000 / 3906000000 |68 / 604 / 4468000000 / 2457000000 | 652800 | 300000 | 300000 | 652800 |460803552 | 399998571 | 133334492 | 200000805 | 29 / 512 / 2860000000 / 3906000000 |68 / 604 / 4468000000 / 2457000000 | 883200 |1036800 | 883200 | 300000 |460803552 | 400003112 | 0 | 200000073 | 29 / 512 / 2860000000 / 3906000000 |68 / 604 / 4468000000 / 2457000000 | 1497600 | 300000 |1497600 |1190400 |460803552 | 399998498 | 133334492 | 199999340 | 29 / 512 / 2860000000 / 3906000000 |68 / 604 / 4468000000 / 2457000000 | 652800 | 729600 | 300000 | 300000 |460803552 | 400001574 | 133334419 | 200000805 | 29 / 512 / 2860000000 / 3906000000 |68 / 604 / 4468000000 / 2457000000 | 652800 | 300000 | 300000 | 422400 |460800036 | 400000036 | 133333907 | 199999340 | 29 / 512 / 2860000000 / 3906000000 |68 / 604 / 4468000000 / 2457000000 | 652800 | 422400 | 300000 | 422400 |460803552 | 400000036 | 133332954 | 200001611 | 29 / 512 / 2860000000 / 3906000000 |68 / 604 / 4468000000 / 2457000000 |

Filing Cases Related to Issues

- If all the suggested debugging methodologies/case studies do not resolve customer issues, we request them to file a CASE with the following information:
  - Correct chipset – AMSS build ID, and Operating System (OS)
  - Initial problem type – Software
  - Problem Area 1 – Multimedia
    - Problems related to audio, video, graphics, browsing, sensors, etc.
  - Problem Area 2 – Power
  - Problem Area 3 – Use case specific
    - Audio, video, graphics, browsing, sensors, etc.
  - Problem Description field
    - Detailed information about the problem
      - Details of the use case if different from QTI standard use case
      - Steps to reproduce the issue.
    - All information about the debugging done by customer till that point
    - All logs suggested in debugging
      - Top, PowerTop, Rail level breakdown, Clock dump, SurfaceFlinger, Ftrace, Systrace,
      - Waveforms, NPA dumps, and any other logs captured

References

Document	
Qualcomm Technologies	
Hexagon™ Multimedia: LPASS Bus/Clock/Voltage Control and Debugging for ADSP.BF.2.0, ADSP.BF.2.2, ADSP.BF.2.4	80-NF768-19
MSM8974 Linux Android™ Power Debugging and Optimization Guide	80-NA157-246
MSM8994 Linux Android™ Current Consumption Data	80-NJ051-7
MSM8936/MSM8939 Linux Android™ Current Consumption Data	80-NM683-7
MSM8994 Windows Phone Modem/Multimedia Use Case Component-Level Power Breakdown and Clk Plan Details	80-NM328-701
MSM8994 Modem/Multimedia Use Case Details	80-NM328-704
MSM8936/MSM8939 Clock Plan	80-NM846-3
Snapdragon™ Performance Visualizer 9.0 User Guide	80-N4717-1

Acronyms

Term	Definition
PC	Power Collapse
SPC	Standalone Power Collapse
WFI	Wait for Interrupt

Questions?

https://support.cdmatech.com