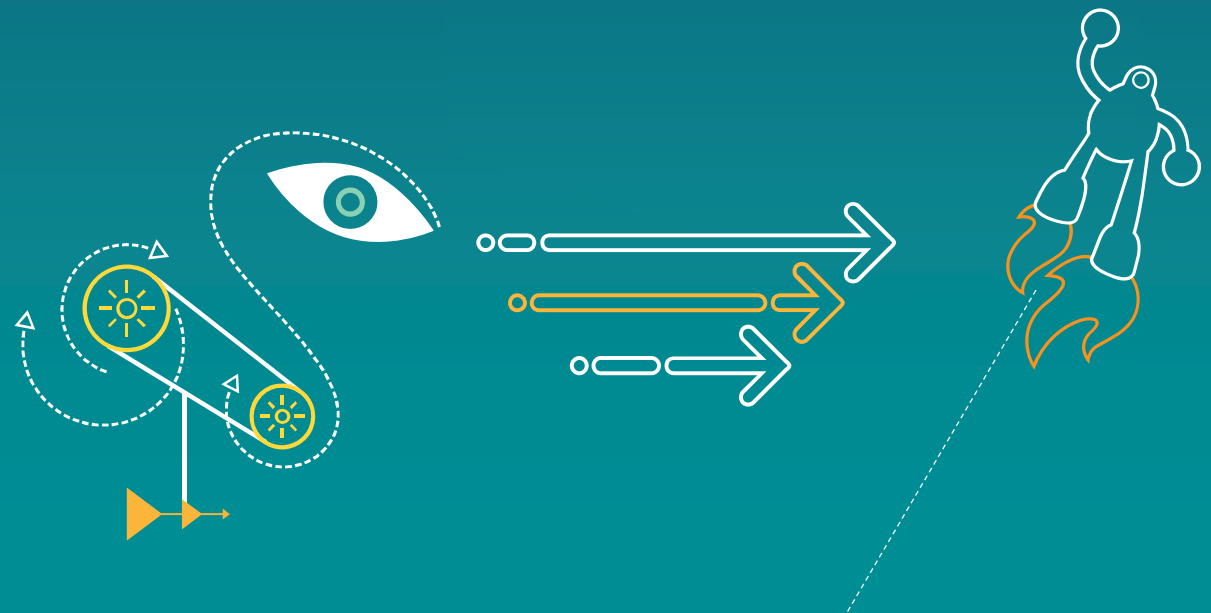
Power Debug Training



Overview

- General power documents
- Architecture
- Power debug/tools
  - Sleep current
  - APSS power
  - System level
- Camera power

Power document

- Power&Thermal Case creation template： KBA-171221000423
- Power/Thermal通用期刊： KBA-170221213554
- Power/Thermal平台期刊： CreatePoint上搜索“功耗温升”
- 其他主要文档

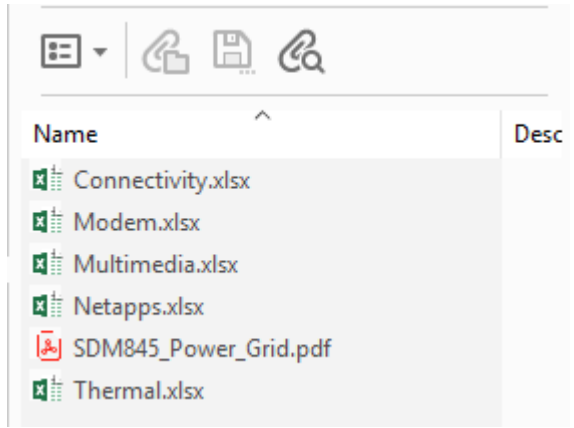
	Document ID	Title
Power	80-P9301-22	SDM845 Power Management Overview
	80-P6348-7	SDM845 Linux Android Current Consumption Data
	80-P9301-116	**SDM845_Extensive_Power_Debug_Guide**
	80-pg596-34	**sm6150_extensive_power_debug_guide**
	80-p9301-16	**rpm_hardening_and_debugging_overview**
	80-p9301-129	**sdm845_rpm_hardening_low-power_mode_debug_overview**
	80-P9301-111	**SDM845_CPUSS_LPM_Overview**
	80-p9301-86	energy_aware_scheduling_and_schedutil_overview
	80-P9301-12	SDM845_Clock_Plan
	80-p9301-16	sdm845_linux_android_software_afchitecture_overview
Thermal	80-P6348-12	SDM845 Chipset Thermal Power Projection
	80-P9301-39	SDM845 Linux Android Software Thermal Management Overview

Power data

- All Qualcomm chipsets have “LA_Current_Consumption_Data” doc, which includes power tree, power projection data(CS goal), power breakdown data. E.g:
  - 80-p6348-7_g_sdm845_linux_android_current_consumption_data.pdf

Table 4-1 (Commercial Software) release current consumption targets

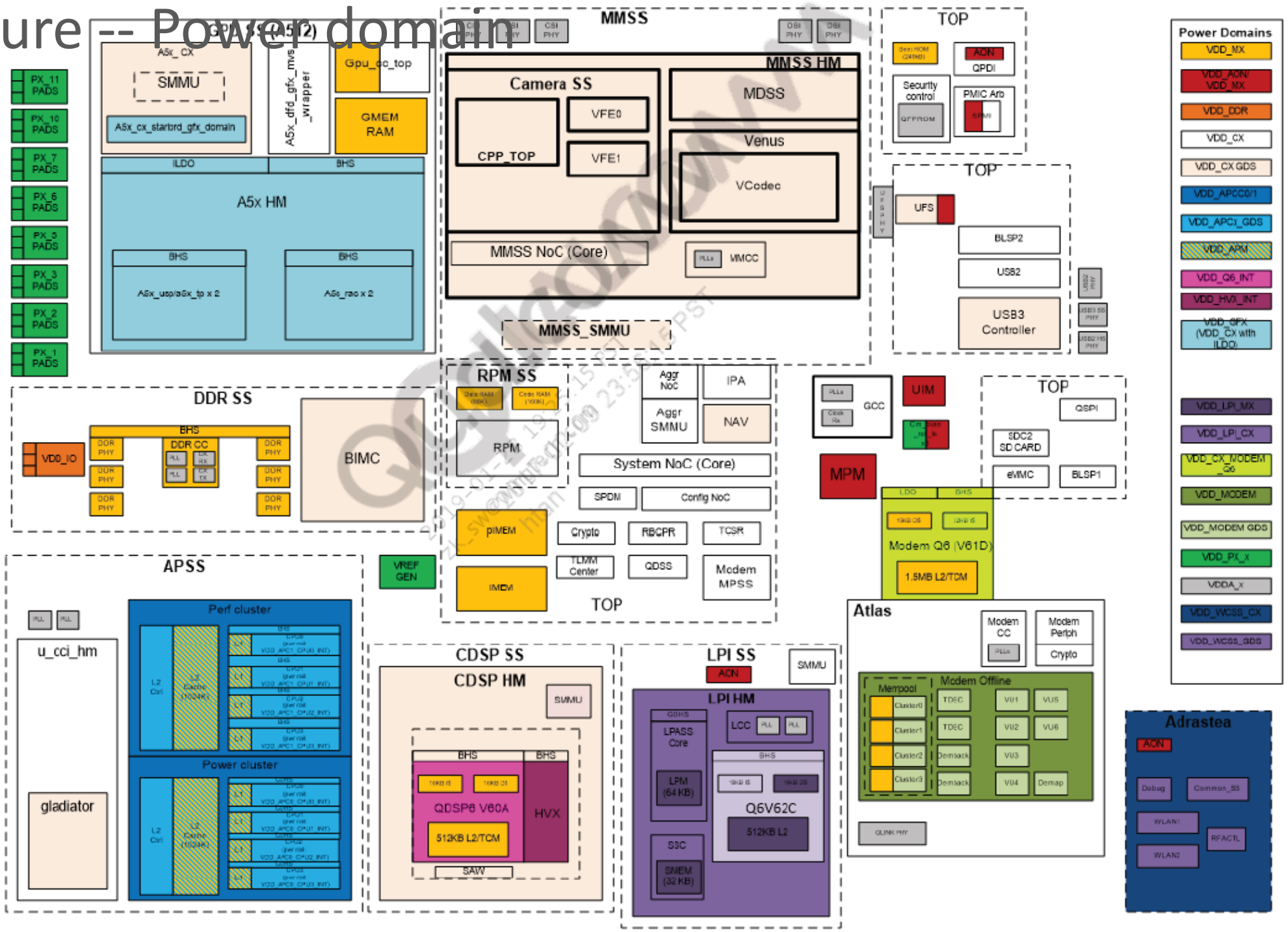
Use case	Test case	Code	RF Band	Tj (°C)	SDM845 CS Goals WQHD Smart Panel 4 GB LPDDR4x (50 to 95 percentile) (mA)
Modem	Airplane Mode	AIR1	–	25	3.38 to 4.5
	WCDMA (2.56 s) Standby	WS1	B1	25	3.63 to 4.83
	CDMA (5.12 s) QPCH Standby	CS2	BC0	25	3.54 to 4.71



- You can find the measurement power data(including power DB and GDOU) in release note.
- E.g, rno-171016170114-XXXXX_1_00355.2_release_note_for_sdm845.la.1.0

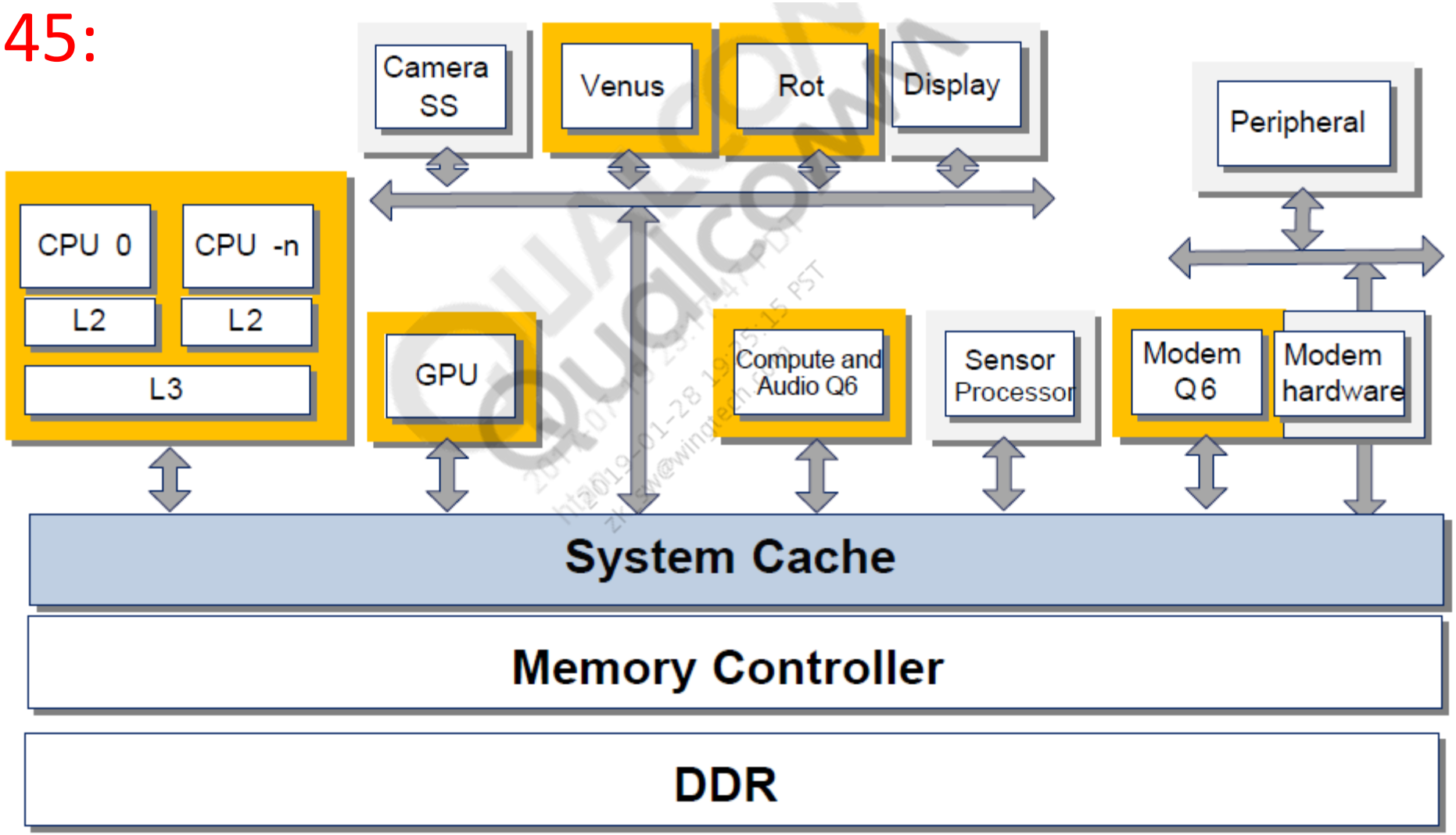
Architecture -- Power domain

SDM660:



Architecture -- System cache

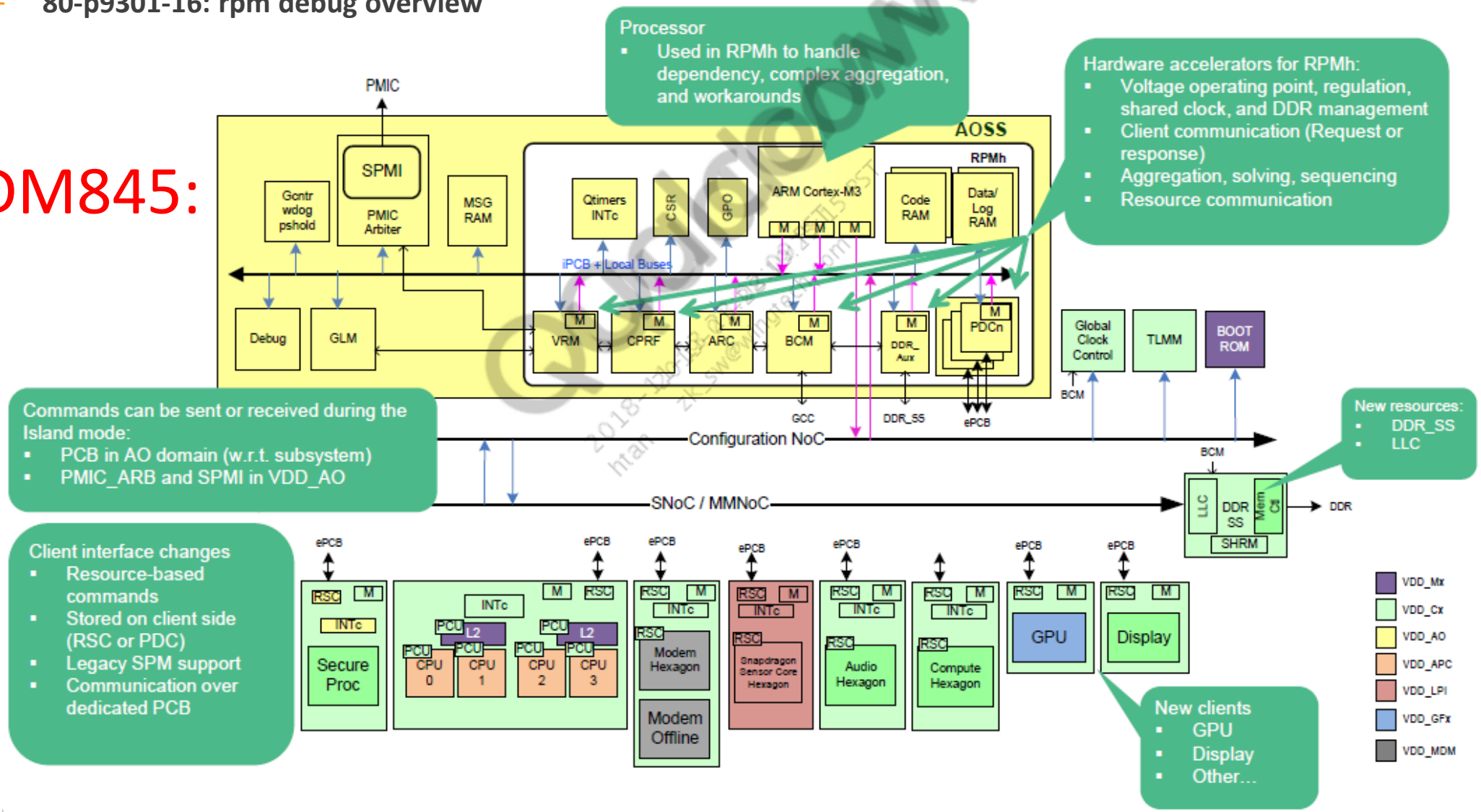
SDM845:



Architecture -- Rpmh/AOP

- Rpmh/AOP architecture
  - **80-p9301-129: rpmh low power mode debug**
  - **80-p9301-16: rpm debug overview**

SDM845:



Architecture -- Clock/Voltage plan

SDM845:

Silver cluster CPU core performance level for SDM845 V2

Performance level	Frequency (MHz)	Source	VDD_APC0
0	300.0	GPLL0	LowSVS
1	403.2	APCPLL0	LowSVS
2	480.0	APCPLL0	LowSVS
3	576.0	APCPLL0	LowSVS
4	652.8	APCPLL0	LowSVS
5	748.8	APCPLL0	LowSVS
6	825.6	APCPLL0	SVS
7	902.4	APCPLL0	SVS
8	979.2	APCPLL0	SVS
9	1056.0	APCPLL0	SVS_L1
10	1132.8	APCPLL0	SVS_L1
11	1228.8	APCPLL0	SVS_L1
12	1324.8	APCPLL0	Nominal
13	1420.8	APCPLL0	Nominal
14	1516.8	APCPLL0	Nominal
15	1612.8	APCPLL0	Nominal_L1
16	1689.6	APCPLL0	Turbo
17	1766.4	APCPLL0	Turbo

Table 2-2 GPU performance level for SDM V2

Performance level	Frequency (MHz)	Source	VDD_GFX
0	257.0	GPU_PLL0	LowSVS
1	342.0	GPU_PLL0	SVS
2	414.0	GPU_PLL0	SVS_L1
3	520.0	GPU_PLL0	Nominal
4	596.0	GPU_PLL0	Nominal_L1
5	675.0	GPU_PLL0	Turbo
6	710.0	GPU_PLL0	Turbo_L1

2.5.9 DDR performance level for SDM845 V2

Performance level	Frequency (MHz)	Source	VDDA	VDD_CX
0	100.00	GPLL0	MinSVS	MinSVS
1	200.00	GPLL2	MinSVS	MinSVS
2	300.00	GPLL0	MinSVS	MinSVS
3	451.20	GPLL2	LowSVS	LowSVS
4	547.20	GPLL2	SVS	SVS
5	681.60	DDRCCPLL	SVS	SVS
6	768.00	DDRCCPLL	SVS	SVS
7	1017.60	DDRCCPLL	SVS_L1	SVS_L1
8	1353.6	DDRCCPLL	Nominal	Nominal
9	1555.20	DDRCCPLL	Nominal	Nominal
10	1804.80	DDRCCPLL	Turbo	Turbo

Table 2-7 Camera BPS performance level

Performance level	Frequency (MHz)	Source	VDD_CX
0	100.00	CAMPLL0	LowSVS
1	200.00	CAMPLL0	LowSVS
2	404.00	CAMPLL1	SVS
3	480.00	CAMPLL2	SVS_L1
4	600.00	CAMPLL0	Nominal

- IPE

```
clock-rates =
        <0 0 0 0 404000000>,
        <0 0 0 0 480000000>,
        <0 0 0 0 538000000>,
        <0 0 0 0 600000000>;
clock-cntl-level = "svs",
        "svs_l1", "nominal", "turbo";
```

Power debug setup

- Trace32 (T32) software/JTAG
- QPST and QXDM tool
- Power breakdown board

- Debug tools for Apps processor

Tools	Install	Where to find
PowerTop/top	adb push <PowerTop location>\powertop /data/ adb shell chmod 777 /data/powertop	Through a Salesforce case
PerfTop	adb push <perf location>\perf /data/ adb shell chmod 777 /data/perf	Through a Salesforce case
tsens_logging	adb push <perf location>\tsens_logging /data/ adb shell chmod 777 /data/tsens_logging	Through a Salesforce case
Pytime chart	https://code.google.com/p/pythonxy/wiki/Downloads After installation, open a command prompt in C:\ and run easy_install pytimechart	https://code.google.com/p/pythonxy/wiki / Downloads
Systrace	http://developer.android.com/tools/sdk/ tools-notes.html	Android SDK toolkit
ftrace	Refer 80-P0955-1/80-P9301-116 for details	Createpoint
systat	systat.exe --clock <clk> <clk>… --msm_bus <bus client> <bus client>…	

Sleep current

- Check the status of AOP shutdown, Cx power collapse, XO shutdown
- Check which subsystem doesn't enter sleep mode

```
sdm845:/ # cat /sys/power/system_sleep/stats
RPM Mode:aosd
        count:22
time in last mode(msec):0
time since last mode(sec):55
actual last sleep(msec):5000

RPM Mode:cxsd
        count:11
time in last mode(msec):0
time since last mode(sec):55
actual last sleep(msec):5000
```

```
sdm845:/ # cat /sys/power/rpmh_stats/master_stats
MPSS
        Version:0x1
        Sleep Count:0x2a2
        Sleep Last Entered At:0x1223ad7f5
        Sleep Last Exited At:0x122359a1c
        Sleep Accumulated Duration:0xefd1c8c2

ADSP
        Version:0x1
        Sleep Count:0x7e
        Sleep Last Entered At:0x9d8529ab
        Sleep Last Exited At:0x9d8471ad
        Sleep Accumulated Duration:0x622934e8

CDSP
        Version:0x1
        Sleep Count:0x66
        Sleep Last Entered At:0x9d85b5ba
        Sleep Last Exited At:0x9d84fce4
        Sleep Accumulated Duration:0x7c557739

SLPI
        Version:0x1
        Sleep Count:0x89c
        Sleep Last Entered At:0xde8230f6
        Sleep Last Exited At:0xde81a7b2
        Sleep Accumulated Duration:0x93f318e2
```

Sleep current(Cont.)

- Parse AOP logs with hansei scripts
  - [aop build location]\core\bsp\aop\scripts\hansei\hansei.py --elf AOP.elf -o aoplog -t 8150 dumpfile .
- Check the resource votes of each RSCs in ARC & BCM logs

ARC dump

```
CX : RM [0] Current OL: 0x7  (TUR_L1), mv: 884, vrm_enb_sts: 1
        AOP : DRV[ 7] Vote : 0x7 ( TUR_L1)
    BCM_CD3 : DRV[ 3] Vote : 0x6 (    TUR)
    BCM_CD5 : DRV[ 5] Vote : 0x5 (    NOM)
    BCM_CD9 : DRV[ 9] Vote : 0x3 (    SVS)

MX : RM [1] Current OL: 0x7  (TUR_L1), mv: 824, vrm_enb_sts: 1
         TZ : DRV[ 0] Vote : 0x1 (    RET)
    SEC_PROC : DRV[ 4] Vote : 0x1 (    RET)
      LPASS : DRV[ 5] Vote : 0x1 (    RET)
        AOP : DRV[ 7] Vote : 0x7 ( TUR_L1)
        GPU : DRV[ 9] Vote : 0x1 (    RET)
       CDSP : DRV[11] Vote : 0x1 (    RET)
        MSS : DRV[12] Vote : 0x1 (    RET)
    BCM_CD3 : DRV[ 3] Vote : 0x6 (    TUR)
    BCM_CD5 : DRV[ 5] Vote : 0x4 (    NOM)
    BCM_CD9 : DRV[ 9] Vote : 0x2 (    SVS)
```

ARC dump

```
XO : RM[9] Vote Table
RM Enabled = 1
    Register Decode:
        CURRENT_OL =      0x3 (   XO_ON)
         SOLVED_OL =      0x0 ( XO_OFF)
      AGGREGATED_OL =     0x3 (   XO_ON)
        SEQUENCE_OL =     0x3 (   XO_ON)
     DESTINATION_OL =     0x3 (   XO_ON)
RM Sequencer Status
    Busy = 0
    PC = 0x0
          TZ : DRV[ 0] Vote : 0x0  ( XO_OFF)
         HYP : DRV[ 1] Vote : 0x0  ( XO_OFF)
        APPS : DRV[ 2] Vote : 0x0  ( XO_OFF)
          L3 : DRV[ 3] Vote : 0x0  ( XO_OFF)
    SEC_PROC : DRV[ 4] Vote : 0x0  ( XO_OFF)
       LPASS : DRV[ 5] Vote : 0x1  (PMIC_BUFFER_OFF)
      SENSOR : DRV[ 6] Vote : 0x0  ( XO_OFF)
         AOP : DRV[ 7] Vote : 0x3  (   XO_ON)
       DEBUG : DRV[ 8] Vote : 0x0  ( XO_OFF)
         GPU : DRV[ 9] Vote : 0x0  ( XO_OFF)
     Display : DRV[10] Vote : 0x0  ( XO_OFF)
        CDSP : DRV[11] Vote : 0x1  (PMIC_BUFFER_OFF)
         MSS : DRV[12] Vote : 0x1  (PMIC_BUFFER_OFF)
      MSS_HW : DRV[13] Vote : 0x0  ( XO_OFF)
     BCM_CD0 : DRV[ 0] Vote : 0x0 ( XO_OFF)
     BCM_CD1 : DRV[ 1] Vote : 0x0 ( XO_OFF)
     BCM_CD2 : DRV[ 2] Vote : 0x0 ( XO_OFF)
     BCM_CD3 : DRV[ 3] Vote : 0x0 ( XO_OFF)
     BCM_CD4 : DRV[ 4] Vote : 0x0 ( XO_OFF)
     BCM_CD5 : DRV[ 5] Vote : 0x3 (   XO_ON)
```

BCM dump

```
|VCD          | AGG_BW | Final_CP | AGG_CP | DDR MGR Override AGG_CP |                    Freq_khz                    |
|0:  rpmh_ddrmc_ch0|  0x3fc7|      0xc|     0xc|                      0xc|gcc_ddrmc_ch0_root_clk_src    :  2092.800000|
|0:  rpmh_ddrmc_ch1|  0x3fc7|      0xc|     0xc|                      0xc|gcc_ddrmc_ch1_root_clk_src    :  2092.800000|
```

Sleep current(Cont.)

- Find which module requests the resource. This needs to check the details in each subsystems.
  - Use QCAP tool to parse the ramdump and get more logs in subsystem, 80-NR964-54, 80-NR964-54SC
  - Crashman tool to parse ulog/npa-dump in ADSP/CDSP, KBA-160614190856
  - T32 to parse ulog/npa-dump for modem core, 80-P0955-1, 80-P9301-116(new platforms)

6.6.1 Collect modem uLogs

Run the following script from Modem_Build in the modem T32 window:

```
do  <Modem_Build>\modem_proc\core\services\diag\diagbuffer\scripts
\UlogDump.cmm  <location to save logs>
```

This places the modem uLogs in the specified directory.

6.6.2 Collect modem NPA logs

Run the following script from Modem_Build in the modem T32 window:

```
do  <Modem_Build>\modem_proc\core\power\npa\scripts\NPADump.cmm
<Location to save logs>
```

This places the modem NPA logs in the specified directory.

Sleep current(Cont.)

- Find which module requests the resource. This needs to check the details in each subsystems.
  - Sm6150 APSS xo sleep issue

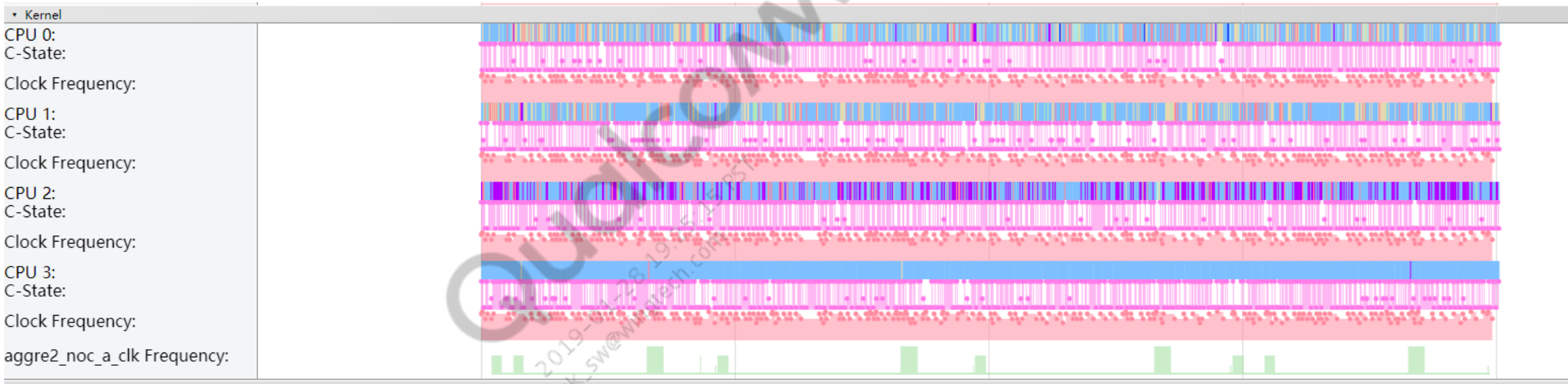
```
[ 1544.480071] Enabled clocks:
[ 1544.480071] video_cc_xo_clk:1:1 [0]
[ 1544.480071] gpu_cc_ahb_clk:1:1 [0]
[ 1544.480071] gcc_video_xo_clk:1:1 [0]
[ 1544.480071] gcc_disp_xo_clk:1:1 [0]
[ 1544.480071] gcc_cpuss_gnoc_clk:1:1 [0]
[ 1544.480071] gcc_camera_xo_clk:1:1 [0]
[ 1544.480071] gcc_video_ahb_clk:1:1 [0]
[ 1544.480071] gcc_usb3_prim_phy_pipe_clk:1:1 [0]
[ 1544.480071] gcc_usb3_prim_phy_com_aux_clk:1:1 [0]
[ 1544.480071] gcc_usb3_prim_phy_aux_clk_src:2:2 [19200000, 2]
[ 1544.480071] gcc_usb3_prim_phy_aux_clk:1:1 [19200000]
[ 1544.480071] gcc_usb3_prim_clkref_clk:1:1 [0]
[ 1544.480071] gcc_sys_noc_cpuss_ahb_clk:1:1 [0]
[ 1544.480071] gcc_gpu_cfg_ahb_clk:1:1 [0]
[ 1544.480071] gcc_disp_ahb_clk:1:1 [0]
[ 1544.480071] gcc_cpuss_ahb_clk_src:2:2 [19200000, 2]
[ 1544.480071] gcc_cpuss_ahb_clk:1:1 [0]
[ 1544.480071] gcc_camera_ahb_clk:1:1 [0]
[ 1544.480071] gcc_ahb2phy_west_clk:1:1 [0]
[ 1544.480071] disp_cc_xo_clk:1:1 [0]
[ 1544.480071] bi_tcxo_ao:2:2 [19200000]
[ 1544.480071] bi_tcxo:2:2 [19200000]
[ 1544.480071] qdss_qmp_clk:13:13 [1]
[ 1544.480071] l3_gpu_vote_clk:1:1 [0]
[ 1544.480071] l3_clk:4:4 [940800000]
[ 1544.480071] l3_misc_vote_clk:1:1 [300000000]
[ 1544.480071] l3_cluster1_vote_clk:1:1 [576000000]
[ 1544.480071] l3_cluster0_vote_clk:1:1 [940800000]
```

- Sdm845 adsp sleep issue

```
npa_resource (name: "/core/cpu/latency/usec") (handle: 0xF04B827C) (sequence: 0x500) (units: uSec) (resource max: -1) (active max: -1) (active state: 1000)
        npa_client (name: SNS_PM_LatencyNode) (handle: 0xF0537098) (resource: 0xF04B827C) (type: NPA_CLIENT_REQUIRED) (request: 0)
        npa_client (name: adsppmsleep) (handle: 0xF05050E8) (resource: 0xF04B827C) (type: NPA_CLIENT_REQUIRED) (request: 1000)
        npa_reserved_event (name: ) (handle: 0xF04C121C) (resource: 0xF04B827C)
        end npa_resource (handle: 0xF04B827C)
npa_resource (name: "/core/cpu/latency") (handle: 0xF04B7F50) (sequence: 0x500) (units: ticks) (resource max: -1) (active max: -1) (active state: 288000)
        npa_client (name: adsppm_adsp_power) (handle: 0xF04F3268) (resource: 0xF04B7F50) (type: NPA_CLIENT_REQUIRED) (request: 0)
        npa_client (name: /node/core/cpu/latency/usec) (handle: 0xF04E0338) (resource: 0xF04B7F50) (type: NPA_CLIENT_REQUIRED) (request: 19200)
        npa_change_event (name: ) (handle: 0xF04BB64C) (resource: 0xF04B7F50)
        end npa_resource (handle: 0xF04B7F50)
```

APSS power -- ftrace analysis by chrome

- Total loading
- CPU frequency
- Clocks



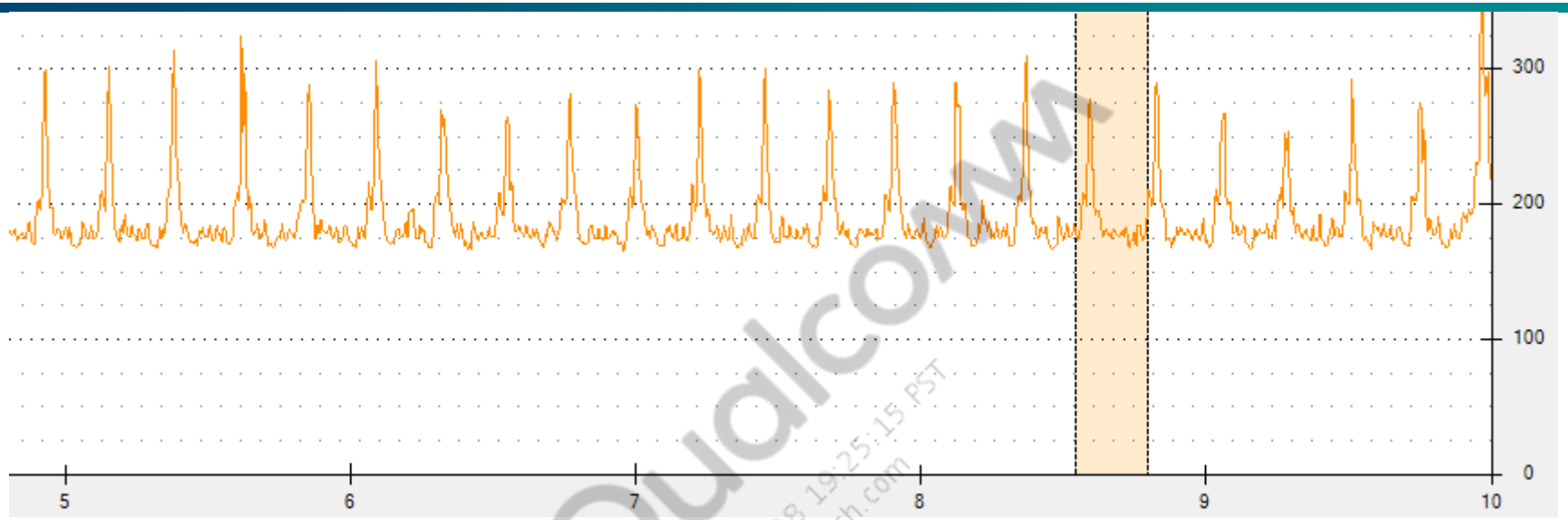
148371 items selected. | CPU Slices (93579) | Counter Samples (54792)

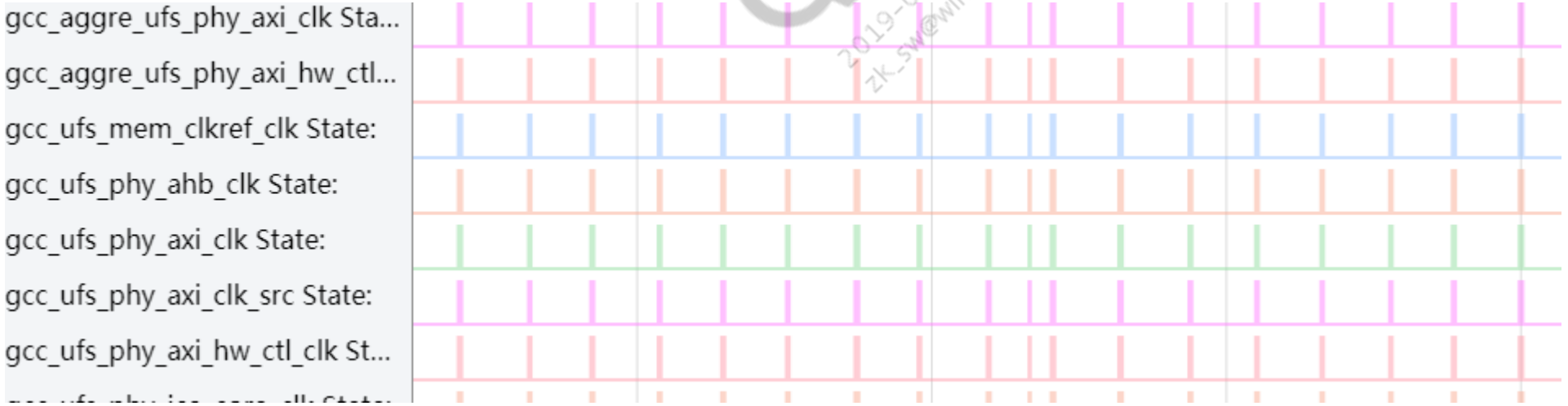
Name	Wall Duration	Average Wall Duration	Occurrences
RenderThread	9,333.893 ms	0.837 ms	11149
composer@2.1-se	3,213.043 ms	1.242 ms	2587
surfaceflinger	3,161.869 ms	0.844 ms	3745
m.baidu.netdisk	2,928.987 ms	0.424 ms	6916
mdss_fb0	1,086.323 ms	0.451 ms	2410
Binder:732_5	918.859 ms	0.172 ms	5328
Binder:732_4	763.551 ms	0.174 ms	4387
EventThread	703.963 ms	0.124 ms	5692
kgsl_worker_thr	695.926 ms	0.284 ms	2453
kworker/u16:21	615.740 ms	0.227 ms	2710
cat	472.603 ms	0.578 ms	817
kworker/u16:10	449.077 ms	0.226 ms	1985
kworker/u16:23	405.348 ms	0.233 ms	1739
kworker/u16:6	371.084 ms	0.225 ms	1650
SensorLogThread	365.680 ms	0.938 ms	390
kworker/1:1	273.158 ms	0.059 ms	4640
Binder:732_3	255.583 ms	0.175 ms	1462
cnss_diag	244.515 ms	1.072 ms	228

APSS power -- ftrace analysis by pytimechart

- Good tool to analyze the behaviors for single thread.

APSS power -- ftrace analysis for current peaks





APSS power -- Top && Perftop

Function call dumpstack

- Top & perf top

✓ **Perf binary**

adb push perf /data/
adb shell chmod 777 /data/perf

✓ **Using Top data to print function calls:**

(for SDM845)
cd data
top -H -O TID //from here, get TID or PID which you'd like to check
./perf top -z -p [PID]
Or
./perf top -z -t [TID]

✓ **Using Top data to print function call stack:**

echo 0 > /proc/sys/kernel/kptr_restrict // please note, this command should be used with caution.
cd data
./perf record -g -p [PID]
Wait a bit, and ctrl+c to stop
./perf report > report.txt

Push symbols for addr2line if necesssary.

APSS power – SurfaceFlinger dump

- Dumpsys SurfaceFlinger
  - Composition type, GPU rendering will cost more power usually.
  - The number of layers
  - The resolution size of layers

```
---------------------------------------------------------------------------------------------
Layer name
           Z |  Comp Type |   Disp Frame (LTRB) |          Source Crop (LTRB)
---------------------------------------------------------------------------------------------
SurfaceView - com.tencent.tmgp.pubgm/com.epicgames.ue4.GameActivity#0
  4294967294 |      Device |    0  144 1080 2136 |    0.0    0.0  720.0 1328.0
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
com.tencent.tmgp.pubgm/com.epicgames.ue4.GameActivity#0
     21005 |      Device |    0  144 1080 2136 |    0.0    0.0 1080.0 1992.0
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
com.tencent.tmgp.pubgm/com.epicgames.ue4.GameActivity:Inset#0
     21006 |      Device |    0    0 1080  144 |    0.0    0.0  144.0 1080.0
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
com.tencent.tmgp.pubgm/com.epicgames.ue4.GameActivity:Inset:Sub#0
     21006 |      Device |    0 2136 1080 2280 |    0.0    0.0  144.0 1080.0
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
__@@RoundLayerUp__@@__#0
 1073741826 |      Device |    0    0 1080  106 |    0.0    0.0 1080.0  106.0
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
__@@RoundLayerDown__@@__#0
 1073741827 |      Device |    0 2191 1080 2280 |    0.0    0.0 1080.0   89.0
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
```

```
---------------------------------------------------------------------------------------------
Layer name
           Z |  Comp Type |   Disp Frame (LTRB) |          Source Crop (LTRB)
---------------------------------------------------------------------------------------------
SurfaceView - com.tencent.tmgp.pubgm/com.epicgames.ue4.GameActivity#0
  4294967294 |      Device |    0  144 1080 2136 |    0.0    0.0  504.0  928.0
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
com.tencent.tmgp.pubgm/com.epicgames.ue4.GameActivity#0
     21015 |      Device |    0  144 1080 2136 |    0.0    0.0 1080.0 1992.0
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
com.tencent.tmgp.pubgm/com.epicgames.ue4.GameActivity:Inset#0
     21016 |      Device |    0    0 1080  144 |    0.0    0.0  144.0 1080.0
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
com.tencent.tmgp.pubgm/com.epicgames.ue4.GameActivity:Inset:Sub#0
     21016 |      Device |    0 2136 1080 2280 |    0.0    0.0  144.0 1080.0
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
```

System level – BW votes/clock dump

- ## Systat

  systat.exe --clock measure_only_bimc_clk measure_only_snoc_clk cam_cc_camnoc_axi_clk gcc_cpuss_gnoc_clk gpu_cc_cx_gfx3d_clk --msm_bus cam_hf_1_mnoc cam_hf_2_mnoc cam_sf_1_mnoc cam_sf_2_mnoc mdss_rotator mdss_sde_ebi mdss_sde_llcc soc:qcom,gpubw soc:qcom,llccbw soc:qcom,memlat-cpu0 soc:qcom,memlat-cpu4 soc:qcom,mincpubw usb0 venus-arm9-ddr venus-ddr soc:qcom,cpubw venus-llcc --rate 0.3

  - PD1821 camera power issue
  - PD1805 Video playback issue

- ## Bus votes

  cd /d/msm-bus-dbg/client-data

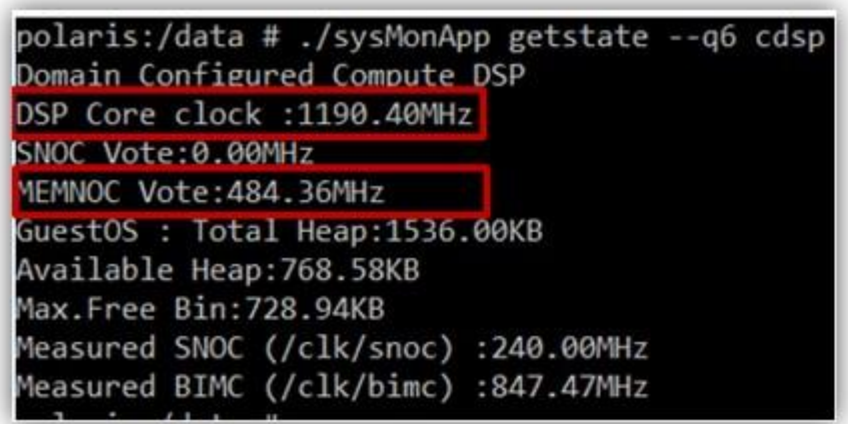
  sleep 10 && while true; sleep 2; echo "start"; do for i in *; do echo " BUS VOTE -> $i:" ;cat $i; done; done > /data/bus_BW1.txt &

- ## Clock dump

  sleep 10 && while true; do echo \=; cat /proc/uptime; cd /sys/kernel/debug/clk; for i in *; do if [-d $i]; then if [-e $i/clk_measure]; then echo $i \=\> clk_enable_count:`cat $i/clk_enable_count` clk_measure:`cat $i/clk_measure` clk_rate:`cat $i/clk_rate`; else echo $i \=\> clk_enable_count:`cat $i/clk_enable_count` clk_rate:`cat $i/clk_rate`; fi; fi; done; echo \-; cd /sys/class/regulator; for i in *; do if [-d $i]; then if [-e $i/state]; then if ["$(cat $i/state)" == "enabled"]; then if [-e $i/microvolts]; then echo $i \=\> name:`cat $i/name` state:`cat $i/state` microvolt:`cat $i/microvolts`; else echo $i \=\> name:`cat $i/name` state:`cat $i/state` microvolt: N\/A; fi; fi; fi; fi; done; sleep 2; done > /sdcard/dumpclk.txt &

System level -- DSP Profiling tools-SysMonApp

- location
  - sysMonApp: \\[ADSP location]\adsp_proc\performance\sysmonapp
  - sysMon Parser: \\[ADSP location]\adsp_proc\performance\tools
  - sysMonApp: \\[CDSP location]\cdsp_proc\performance\sysmonapp
  - sysMon Parser: \\[CDSP location]\cdsp_proc\performance\tools
- CMD
  - ./sysMonApp getstate --q6 cdsp
  - adb shell /data/sysMonApp profiler --q6 adsp --defaultSetEnable 0
  - adb pull /sdcard/sysmon.bin <destination directory>\<filename.bin>
  - SysmonParser.exe <Input file name>.bin <Output file name> user
    - Final DSP Clk(Mhz)
    - Final MemNoc Clk Projected(Mhz)



L	M	N
Final DSP Clk(MHz)	Final MemNoc Clk Vote(MHz)	Final MemNoc Clk Projected(MHz)
1190.4	484.363	933
1190.4	484.363	933
1190.4	484.363	933
1190.4	484.363	933
1190.4	484.363	933
1190.4	484.363	933
1190.4	484.363	933
1190.4	484.363	933
1190.4	484.363	933
1190.4	484.363	933
1190.4	484.363	933
1190.4	484.363	933
1190.4	484.363	933
1190.4	484.363	933
1190.4	484.363	933
1190.4	484.363	933
1190.4	484.363	933
1190.4	484.363	933
1190.4	484.363	933
1190.4	484.363	933
1190.4	484.363	933

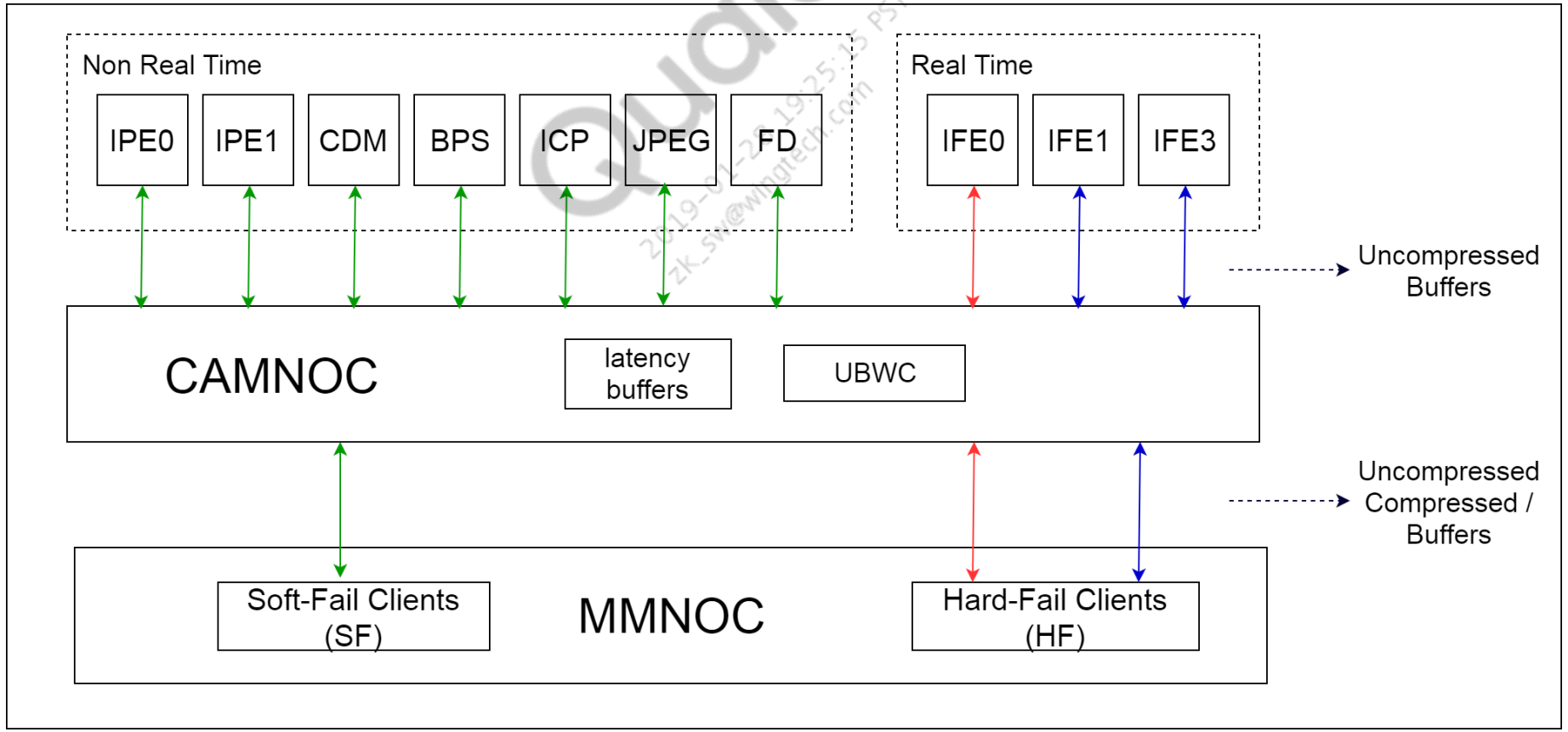
Modem power

- 待机问题
  - 电流波形
  - QXDM log
  - Android log
- 通话/data
  - 电流波形
  - Ramdump
  - QXDM log,
  - Android logs
  - Call box, AP wakeup, PA, multi-mic, 3rd algo

Camera Power Debug

AXI voting mechanism

- Unlike previous targets where each individual blocks have direct DDR interface to MMNOC, on Titan all the traffic goes through CAMNOC to MMNOC.
  - All the hw cores are connected to CAMNOC : Bus traffic from hw blocks to CAMNOC is uncompressed data as UBWC block and compression happens inside the CAMNOC block.
  - CAMNOC is connected to MMNOC : Bus traffic from CAMNOC to MMNOC is compressed/uncompressed depending upon UBWC.



Tunable parameters

Target	Module	Power-friendly	Perf-friendly
CX/DDR,EBI	llccbw(/sys/class/devfreq/soc:qcom,llccbw/bw_hwmon)	sample_ms/hist_memory/hyst_length/hyst_trigger_count/io_percent	minfreq
CX/Gnoc,Memnoc,LLCC	cpubw(/sys/class/devfreq/soc:qcom,cpubw/bw_hwmon)	sample_ms/hist_memory/hyst_length/hyst_trigger_count/io_percent	
APC(silver,gold)	cpufreq(sys/devices/system/cpu/cpufreq/policy0/schedutil)/schedutil(/proc/sys/kernel/sched*)	pl/sched_downmigrate/sched_upmigrate	scaling_min_freq
GPU	gfx(sys/class/kgsl/kgsl-3d0)	idle_timer/…	min_pwrlevel

- Introduction :
  - 80-p9301-86: CPU scheduler, governor
  - 80-PB236-1: Bus DCVS overview

Perflock implementation for camera

- Config:
  - /vendor/etc/powerhint.xml

```
<Config
    Id="0x00001336" Enable="true" Target="sdm845"
    Resources="0x40C68100, 0xFFFFFFF6, 0x40C68110, 0xFFFFFFF6, 0x40C68120, 0xFFFFFFF6,
    0x40C68130, 0xFFFFFFF6, 0x41820000, 0x14, 0x4180C000, 0x0, 0x4300C000, 0xA, 0x43008000, 0x0,
    0x41808000, 0x41, 0x41444100, 0, 0x41444000, 0"/>
```

- Source code
  - vendor/qcom/proprietary/android-perf/mp-ctl/OptsHandler.cpp
  - vendor/qcom/proprietary/android-perf/mp-ctl/mp-ctl.h
  - vendor/qcom/proprietary/chi-cdk/vendor/chioverride/default/chxperf.h
  - vendor/qcom/proprietary/chi-cdk/vendor/chioverride/default/chxperf.cpp

Camera power debug guide

- Please refer DCN#80-np961-1