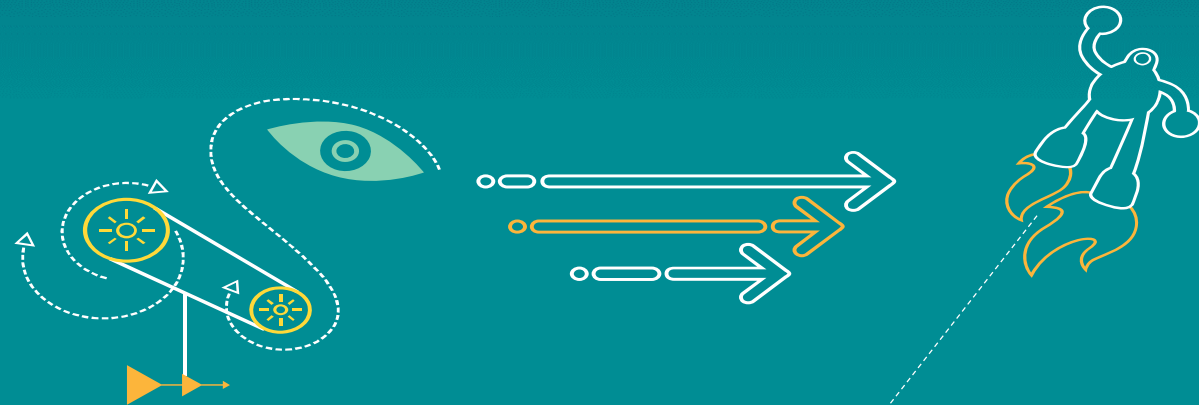

SDM670 Performance Tuning Checklist



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Revision History

Revision	Date	Description
A	Dec 25, 2017	Initial SDM670 version

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SDM670 Performance Tuning Checklist

- [SDM670 Performance Tuning Preparation](#)
- [SDM670 Performance Documents](#)
- [SDM670 Performance Debugging Tools and commands](#)
- [SDM670 Performance Patches list](#)
- [Android-O known issue/ AOSP regression](#)
- [SDM670 Performance tuning guide](#)
- [Appendix](#)

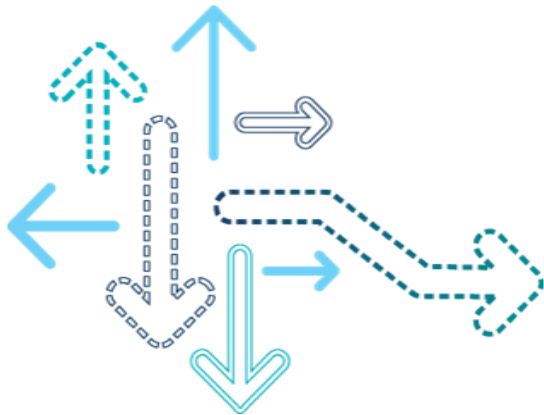
Checklist --- SDM670 Performance Tuning Preparation

- Performance Tuning Build Preparation
 - Kernel configuration verification
 - Always use sdm670-perf_defconfig for Performance measurement
 - The file location for SDM670 is /kernel/msm-4.9/arch/arm64/configs/sdm670-perf_defconfig
 - Check if the following build configure are in your build or not, if have, remove them. Refer to **Appendix-1: Kernel Configuration Must Remove** for details
- Performance Sanity Testing
 - Run device analyzer get configuration details

SDM670 Performance Document

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SDM670 Performance Document



Document --- SDM670 Performance Document (1)

- Scheduler
 - 80-P9301-86 QTI EAS OVERVIEW
- Perflock
 - 80-NT384-2 PERFLOCK IN ANDROID O
 - 80-NR256-2 MPCTL feature
- Android-O known issue : [KBA-171207004924](#)
- Isolation
 - 80-P0106-2 Core_Isolation
 - 80-P8754-73 Perfdump Overview
- Common Performance Debugging Manual
 - 80-P0584-1 Common Performance Issues Debugging Guide
 - 80-NJ221-1 Android Memory Leak Analysis Guide
 - 80-NM449-1 Android User Experience Performance Overview Mem Analysis

Document --- SDM670 Performance Document (2)

- Android UX Improvement/Debugging Guide
 - FPS
 - 80-NP885-1 Graphics Power Performance Overview
 - 80-P0397-1 A Fence Sync Object Overview
- Android Boot
 - 80-N9266-1 Android Boot Time Measurement
- Memory
 - 80-NJ221-1 ANDROID MEMORY LEAK ANALYSIS GUIDE
 - 80-NJ395-1 Linux_Memory_Management_Overview
 - 80-NV303-1 Memory_Optimization_Guidelines
- Other
 - 80-P5228-1 MEMORY LATENCY GOVERNOR OVERVIEW
 - 80-PD126-30 SDM670 Android Performance Overview

Document --- SDM670 Performance Document (3)

UX performance KBA

Target	KBA	Title
ALL	KBA -160720223639	Bootanimation Bootanimation
ALL	KBA -160919232945	How to debug boot time performance
ALL	KBA -161122000928	1st boot become longer after OTA
ALL	KBA -161215230811	Latency of system waken up by proximity sensor
ALL	KBA -161207171534	Multi task package scan
ALL	KBA -170329001516	How to use SCHED_BOOST
ALL	KBA -161228002343	WeChat lucky money boost
ALL	KBA -170521194510	Android N App launch latency
ALL	KBA -170608023831	one example of wrong property set which impact UX performance performance
ALL	KBA -170606202440	MTP performance optimization
ALL	KBA -170527011046	Touch response improvement on android -N
ALL	KBA -170527022128	Animation FPS on android-N

Document --- SDM670 Performance Document (4)

System performance KBA

Target	KBA	Title
All	KBA -160726183346	How to debug IO performance issue
All	KBA -161003054532	display underrun issue debug guide
All	KBA -161002045417	device wakeup time analysis and breakdown
All	KBA -161020010256	MALLOC_IMPL 配置
All	KBA -161112021800	kernel config sanity check
All	KBA -161212224139	Cts SimpleperfTestCases fail on Android N
All	KBA -161226222454	How to configure SLUB related kernel
All	KBA -161129001518	How to enable Dex Dexoptimize for 3rd APPs in Android N
All	KBA -170326205035	How to configure retained surface on Android N
All	KBA -170518235211	Condition:: waitRelativewait() to timeout early or delayed issue
All	KBA -170501211224	extreme low memory issue due to LMK blocked by improper mutex usage.
SDM670/SDM660	KBA -170523012205	how to configure perflock based on resolution
SDM670/SDM660	KBA -170409185902	How to enable and configure CPUSET on QCOM platform.
SDM670/SDM660	KBA -170606023629	Detailed CPUSET configuration explain
SDM670/SDM845	KBA -170606232259	New tunable on SDM660/SDM845

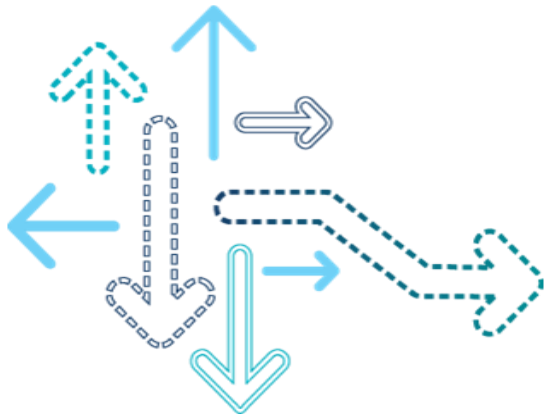
Document --- SDM670 Performance Document (5)

Debugging Tool, Debugging Methods KBA

Target	KBA	Title
All	KBA -160724222150	How to disable QCOM optimizationand ART
All	KBA -160803171155	How to collect offline systrace
All	KBA -161001235906	Systrace tips
All	KBA -161023190436	Linker debug tips
All	KBA -161122014243	How to add systrace in java and native code
All	KBA -161123204012	common performance issue and debug
All	KBA -161027185718	bootchart usage
All	KBA -161112022251	method to capture device boot up ftrace logs
All	KBA -161207172441	How to calculate FPS
All	KBA -170114011739	Android memory map generation and debugging
All	KBA -170114011858	how to customize splash logo without mem leak
All	KBA -170404214811	How to analyze and debug kernel static memory size

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SDM670 Performance Debugging Tools and commands



Tools --- SDM670 Performance Debugging Tools

- External Tools

- Systrace

General Debugging tool for performance debugging.

<http://developer.android.com/tools/help/systrace.html>

- Traceview

Profiling tool for Java method

<http://developer.android.com/intl/zh-cn/tools/help/traceview.html>

- Hierarchy Viewer

Visualize tool to exam View layout Hierarchy

<http://developer.android.com/intl/zh-cn/tools/help/hierarchy-viewer.html>

- Perfdump tool

80-P8754-73 Perfdump Overview

Tools --- SDM670 Performance Debugging commands

- [cpu performance mode](#)
- [gpu performance mode](#)
- [disable/enable LPM](#)
- [disable/enable perflock hal](#)
- [disable thermal/bcl](#)

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Command – how to boost CPU frequency

To put all CPU in performance mode

```
adb root
adb shell "echo 1 > /sys/devices/system/cpu/cpu0/online"
adb shell "echo 1 > /sys/devices/system/cpu/cpu1/online"
adb shell "echo 1 > /sys/devices/system/cpu/cpu2/online"
adb shell "echo 1 > /sys/devices/system/cpu/cpu3/online"
adb shell "echo 1 > /sys/devices/system/cpu/cpu4/online"
adb shell "echo 1 > /sys/devices/system/cpu/cpu5/online"
adb shell "echo 1 > /sys/devices/system/cpu/cpu6/online"
adb shell "echo 1 > /sys/devices/system/cpu/cpu7/online"
adb shell "echo performance > /sys/devices/system/cpu/cpu0/cpufreq/scaling_governor"
adb shell "echo performance > /sys/devices/system/cpu/cpu1/cpufreq/scaling_governor"
adb shell "echo performance > /sys/devices/system/cpu/cpu2/cpufreq/scaling_governor"
adb shell "echo performance > /sys/devices/system/cpu/cpu3/cpufreq/scaling_governor"
adb shell "echo performance > /sys/devices/system/cpu/cpu4/cpufreq/scaling_governor"
adb shell "echo performance > /sys/devices/system/cpu/cpu5/cpufreq/scaling_governor"
adb shell "echo performance > /sys/devices/system/cpu/cpu6/cpufreq/scaling_governor"
adb shell "echo performance > /sys/devices/system/cpu/cpu7/cpufreq/scaling_governor"
#bw vote max
adb shell "echo performance > /sys/class/devfreq/soc:qcom,cpubw/governor"
adb shell "echo performance > /sys/class/devfreq/soc:qcom,mincpubw/governor"
adb shell "echo performance > /sys/class/devfreq/soc:qcom,memlat-cpu0/governor"
adb shell "echo performance > /sys/class/devfreq/soc:qcom, memlat-cpu6/governor"
```

Command – how to boost GPU frequency

```
adb shell "echo 0 > /sys/class/kgsl/kgsl-3d0/min_pwrlevel"  
adb shell "echo 1 > /sys/class/kgsl/kgsl-3d0/force_clk_on"  
adb shell "echo performance > /sys/class/kgsl/kgsl-3d0/devfreq/governor"
```

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Command – How to start/stop perflock HAL

- Disable:

```
adb root  
adb shell "stop perf-hal-1-0"
```

- Enable (default enabled)

```
adb root  
adb shell "start perf-hal-1-0"
```

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Command – how to isolate CPU

To isolate CPU, can be change max_cpus/min_cpus by sysfs:

Power(Little) cluster:

`/sys/devices/system/cpu/cpu0/core_ctl/max_cpus`

`/sys/devices/system/cpu/cpu0/core_ctl/min_cpus`

To isolate CPU by perflock with parameter:

`MPCTLV3_MIN_ONLINE_CPU_CLUSTER_BIG = 0x41000000,`

`MPCTLV3_MIN_ONLINE_CPU_CLUSTER_LITTLE = 0x41000100,`

`MPCTLV3_MAX_ONLINE_CPU_CLUSTER_BIG = 0x41004000,`

`MPCTLV3_MAX_ONLINE_CPU_CLUSTER_LITTLE = 0x41004100,`

To check if the core X is isolated by:

`adb shell cat /sys/devices/system/cpu/cpuX/isolate`

Note: By providing the same number for min_cpus and max_cpus with available core numbers, core isolation is disabled

Command – how to disable LPM

To disable all level LPM by sysfs node:

```
adb shell "stop perf-hal-1-0"
```

```
adb shell "echo Y > /sys/module/lpm_levels/parameters/sleep_disabled"
```

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Command – how to disable thermal, BCL

Thermal:

```
adb root
adb shell stop thermal-engine
```

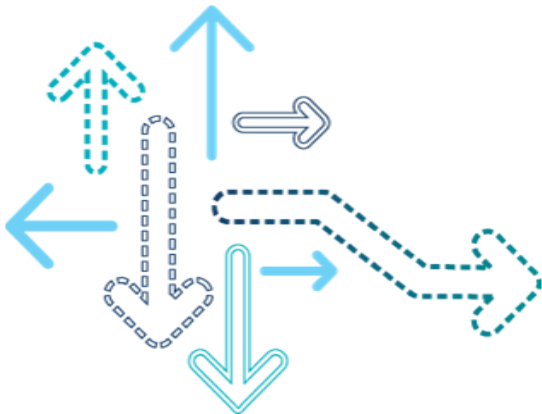
BCL: pm660.dtsi

Add “disable-thermal-zone;” to ibat-high/ibat-vhigh/vbat_low/vbat_too_low/vbat_adc

```
ibat-vhigh {
    polling-delay-passive = <0>;
    polling-delay = <0>;
    thermal-governor = "step_wise";
    thermal-sensors = <&bcl_sensor 1>;
    disable-thermal-zone;
}
```

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SDM670 CR/Patches Checklist



Patch Checklist --- SDM670 Performance Patches SDM670(1 – system cont.)

N -- No Impact

- means Side Effect

+ means Good Impact

CR	Fix/Workaround	CAF Link	Perf	Power	Stability	Comment
2127636	ARM: dts: msm: Update energy numbers for SDM845	https://source.codeaurora.org/quic/la/kernel/msm-4.9/commit/?h=msm-4.9&id=945fd6c80d529f1ee9afa9a6ddb945e29c51c938	+	+	-	
	lpm_levels: Return true for CPU WFI mode allow check	https://source.codeaurora.org/quic/la/kernel/msm-4.9/commit/?h=msm-4.9&id=f2a21e79165fdcf88c3485f49e15d700de7bf678				
	drivers: cpuidle: lpm-levels: LPM prediction tuning	https://source.codeaurora.org/quic/la/kernel/msm-4.9/commit/?h=msm-4.9&id=3662b473fde9fe1ec0b443f7951bb51311f546f0				
	drivers: cpuidle: lpm-levels: Add support per cluster prediction	https://source.codeaurora.org/quic/la/kernel/msm-4.9/commit/?h=msm-4.9&id=73810927d85c526e4a60e8493379360e5be0af4b				
	ARM: dts: msm: Enable prediction for Silver CPUs for SDM845	https://source.codeaurora.org/quic/la/kernel/msm-4.9/commit/?h=msm-4.9&id=c6157e21a5d8dca663f13969b24c3bfc51593ba1				
2129529	soc: qcom: Make use of no log api for register read and write	https://source.codeaurora.org/quic/la/kernel/msm-4.9/commit/?h=msm-4.9&id=0ef46b3f12f6a930c42d25f1b0bbd4c95e609db8				
2133530	iop: Return event queue node to memroy pool	No opensource. Please file SR to get this patch			+	Memory leak
NO	Update gold Cluster L3 Ratio Ceil for sdm845	https://source.codeaurora.org/quic/la/device/qcom/common/commit/?id=8422f7fc18325af70d7b6b660c9a17c1acd2c197	+			Geekbench ST
2159655	sepolicy: update devfreq nodes with secontext	https://source.codeaurora.org/quic/la/device/qcom/sepolicy/commit/?id=36e822b97bbde1af08cd62caa474126368e2cc63	+	-	-	Antutu score

Patch Checklist --- SDM670 Performance Patches SDM670(2 – boot/shutdown time)

N -- No Impact

- means Side Effect

+ means Good Impact

CR	Fix/Workaround	CAF Link	Perf	Power	Stability	Comment
2127982	Cryptfs cost more time which impact boot time.	No opensource. Please file SR to get this patch	+			
2154712	ARM: dts: msm: Remove unused bus master ports for sdm845	https://source.codeaurora.org/quic/la/kernel/msm-4.9/commit/?h=msm-4.9&id=0b9f0b591e4632b2912752fd0c7b89ba1c337290	+			Boot time
2156952	ARM: dts: msm: Move PDC node defination for sdm845/sdm670	https://source.codeaurora.org/quic/la/kernel/msm-4.9/commit/?h=msm-4.9&id=04f03216e2aeb3f59fdc57d60a0602baabf9fa1a	+			Boot time
2151242	SDM845 : Boot time regression : 700ms regression observed during Bootloader phase on V2.0.1	No opensource. Please file SR to get this patch	+			Boot time
2127982	Cryptfs cost more time which impact boot time.	No opensource. Please file SR to get this patch	+			Boot time
2149948	Bootup time Initial optimizations at sensors HAL	NO CAF https://review-android.quicinc.com/#/c/2165692		+	+	Boot time*

Patch Checklist --- SDM670 Performance Patches SDM670(3 - UX)

N -- No Impact

- means Side Effect

+ means Good Impact

CR	Fix/Workaround	CAF Link	Perf	Power	Stability	Comment
2029791	ndroid-perf: return unique handle when client triggers perfLockAcquire/perfHint and add API perfLockReleaseHandler	No opensource. Please file SR to get this patch				Bug fix
2101801	IOP : Replacing strncpy function with strncpy	No opensource. Please file SR to get this patch	-	-	-	Bug fix
2106020	perflock: fix array size for holding cpu frequencies	No opensource. Please file SR to get this patch	-	-	-	Bug fix
2107913	android-perf: added MTP boost	No opensource. Please file SR to get this patch	+	-	-	MTP transfer speed improvement *
2105390	Update LBv1 params for SDM845	No opensource. Please file SR to get this patch				
2107265	Determining process liveliness	No opensource. Please file SR to get this patch				
2081365	perflock: add L3 and LLCC bwmon	No opensource. Please file SR to get this patch				
2081264	Move data file to vendor and core_ctl prop update	No opensource. Please file SR to get this patch				
2072292	Removing unnecessary libs linkage for libqti-perfd-client.so	No opensource. Please file SR to get this patch	-	-	-	Bugfix
2105342	Update framework call for to pass the directory path	No opensource. Please file SR to get this patch				
2111371	android-perf: enhance perf interface for stability	No opensource. Please file SR to get this patch	+	-	+	Stability
2119385	IOP HAL : Adding support for 2.0 HAL.	No opensource. Please file SR to get this patch				Feature
2138464	com_qualcomm_qti_performance_native_perf_hint crash	No opensource. Please file SR to get this patch	-	-	+	Stability
2093634	PerfHint interface takes long time when calling perflock in android O	No opensource. Please file SR to get this patch	-	-	+	stability
2136727	IOP: Modify database permission	No opensource. Please file SR to get this patch	-	-	+	IOP bugfix

Patch Checklist --- SDM670 Performance Patches SDM670(3 - UX)

<i>N -- No Impact - means Side Effect + means Good Impact</i>						
CR	Fix/Workaround	CAF Link	Perf	Power	Stability	Comment
2161614	iop: Adding end point for traces	No opensource. Please file SR to get this patch	-	-	-	Bug fix
2147207	ANDROID: binder: init desired_prio.sched_policy before use it	https://source.codeaurora.org/quic/la/kernel/msm-4.9/commit/?h=msm-4.9&id=598fd897f22320e00f18ce183bc489cfa420320	+	-	-	Bug fix, FPS/jank improve
2156348	perf-hal: Removing android.hidl.base@1.0.so lib as deprecated on O-MR1	No opensource. Please file SR to get this patch	-	-	-	Bug fix
2155862	iop: Replacing iop share lib with vendor lib	No opensource. Please file SR to get this patch	-	-	-	
2144168	QPerformance: Resetting handle on perf lock rel call	No opensource. Please file SR to get this patch	-	-	+	Bug fix
2145567	QPerformance: add error checking	No opensource. Please file SR to get this patch	-	-	+	Bug fix
2153699	Add param check in perfHint to avoid exception	No opensource. Please file SR to get this patch	-	-	+	Bug fix
2163786	Tune boost config	No opensource. Please file SR to get this patch	+	+	*	FLL improve after Reboot *
2163790	Enable perflock for animation	No opensource. Please file SR to get this patch	+	+	-	Sub LL improvement *
2166045	improve touch event response	No opensource. Please file SR to get this patch	+	+	*	FLL improvement *

Patch Checklist --- SDM670 Performance Patches SDM670(4 - scheduler)

N -- No Impact

- means Side Effect

+ means Good Impact

CR	Fix/Workaround	CAF Link	Perf	Power	Stability	Comment
2136416	sched: Honor schedtune.prefer_idle flag	https://source.codeaurora.org/quic/la/kernel/msm-4.9/commit/?h=msm-4.9&id=e92dd7f7c102b27a1a852ef240ec36c41a21fd64	+	+	-	
2136679	sched/fair: Respect wake to idle over sync wakeup	https://source.codeaurora.org/quic/la/kernel/msm-4.9/commit/?h=msm-4.9&id=a5fb35631a2c591b333b124714aa8c4df7fbbaa7	+	-	-	
2170483	sched_boost depends on CONFIG_SCHED_DEBUG	Will update CAF link later	-	-	-	Bug fix
2167906	sched: walt: Fix cpu_capacity_orig stuck issue	Will update CAF link later	+	-	-	Game FPS
2163791 2157031	The binder patches missing for inheriting RT (Platform)	https://android.googlesource.com/kernel/common/+9add7c47ec5557606381ada373beba3b57a4d5%5E%21/#F0 https://android.googlesource.com/platform/system/libhwbinder/+14c6e409a4b29f77e5ed2f24e62dc9d3366fc61a%5E%21/#F0	+	+	-	Fps improvement *

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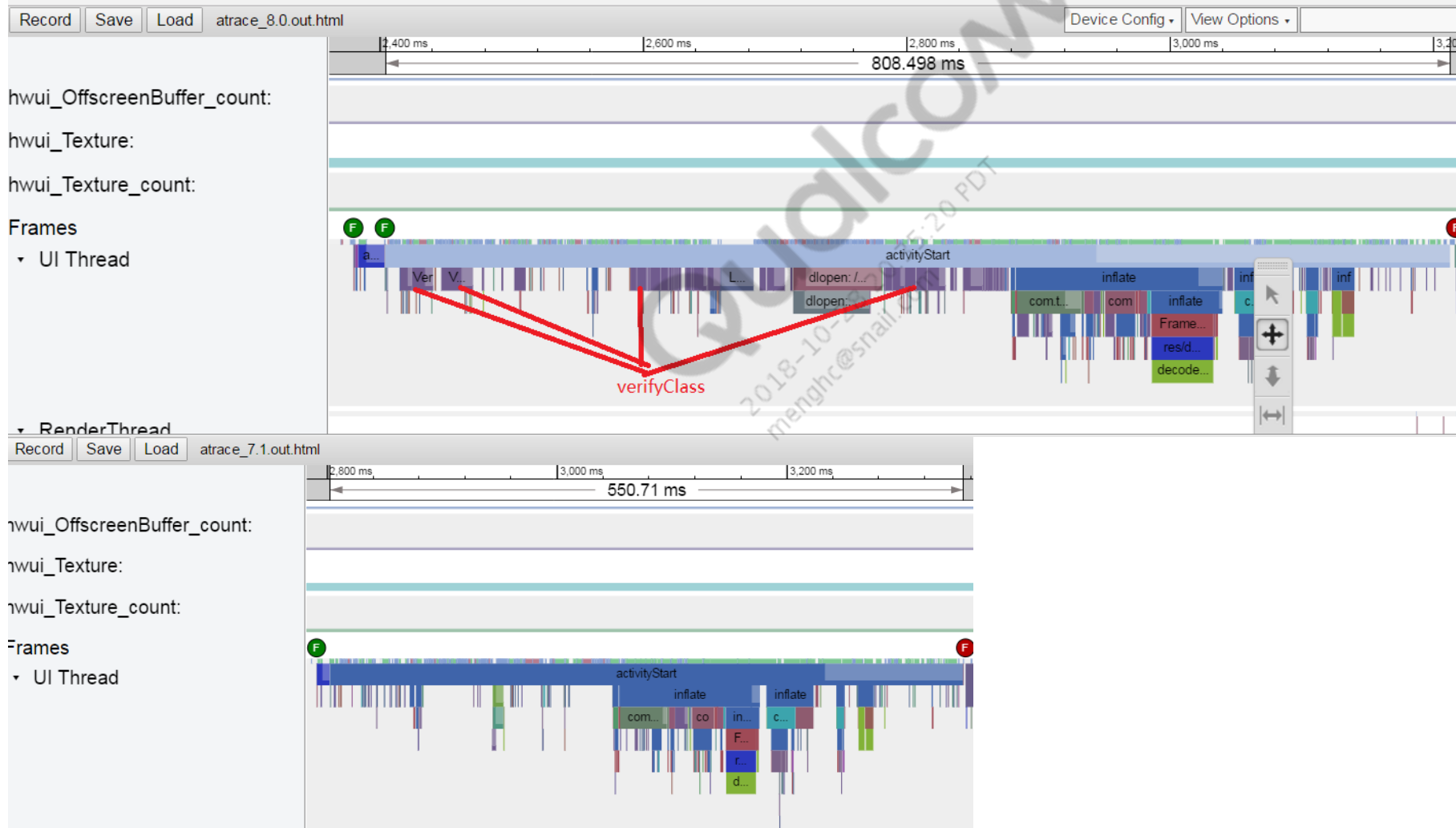
Android-O known issue/ AOSP regression

Android-O known issue/ AOSP regression

- Android-O known issue : [KBA-171207004924](#)
- Latest AOSP O regresssion:
 - [Launch latency of Taobao is worse in android-o than android-N](#)
 - [Big janks in CF game\(com.tencent.tmgp.cf\)](#)
 - [Long black screen in first launch of candycrash app](#)
 - [Pop noise when playing com.huajiao live show in background](#)

Launch latency of Taobao is worse in android-o than android-N

- There are many **verifyClass** in android-o: this verifyClass is for 3rd plugin jars



Launch latency of Taobao is worse in android-o than android-N

- **Root cause:** jar compilation flags is changed in android-o to reduce dex2oat duration in cost of execution speed
art/runtime/oat_file_assistant.h
static const CompilerFilter::Filter kDefaultCompilerFilterForDexLoading =
 ..
 CompilerFilter::kSpeed;
 ...
- **Suggestion:** put system apps that performance critical into list of PRODUCT_DEXPREOPT_SPEED_APPS

	Android-n	Android-o
primary dex (classes.dex installation)	interpret	quicken
non primary, plugin multi-dex ?	speed	quicken
pre odex in host	speed	default: quicken speed if is in the list of PRODUCT_DEXPREOPT_SPEED_APPS PRODUCT_SYSTEM_SERVER_APPS

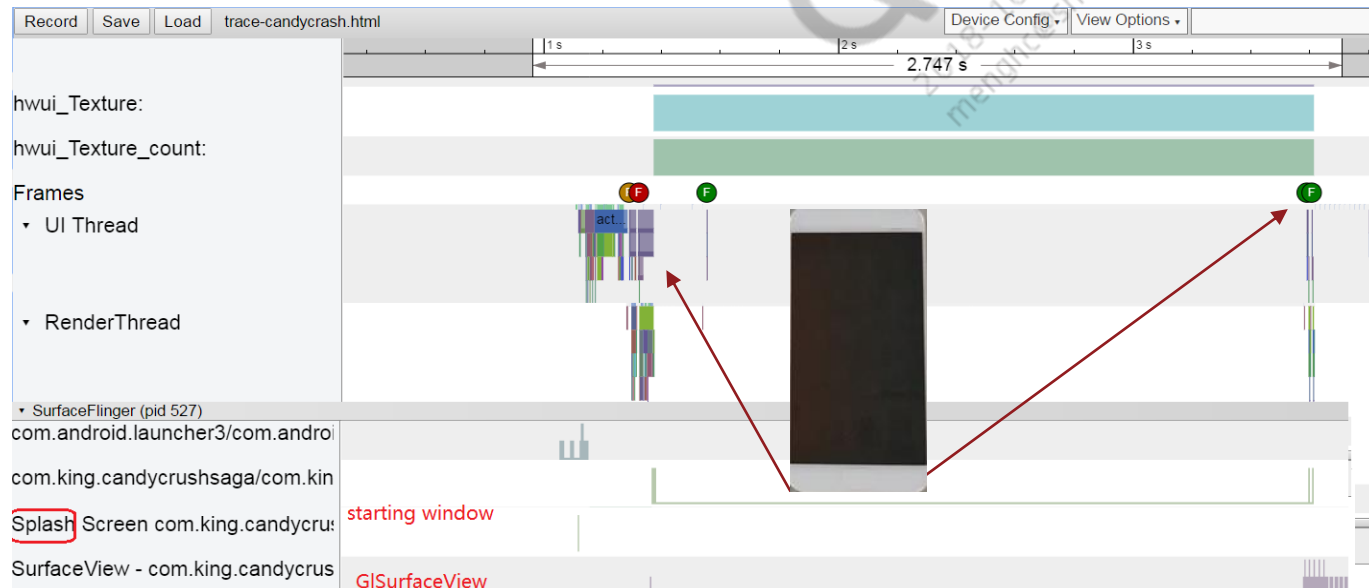
Long black screen in first launch of candycrush app

- **Long black screen in candycrush, caused by SurfaceView changes in android-o**
In android-O, activity will wait for all surface of activity to be drawn, then report “finishDrawn” to WMS.
There is an additional SurfaceView on candycrush which take 2s+ to finish the first frame, hence UI stay at black screen(starting window) for a long time. original design intent of app is to show a static picture before the drawn of game content
- **Suggestion:**
Change from app is needed to adapted to new Api set: reducing first frame of Game thread
Other game may get impacted as well: verify with this changes

framework/base/core/java/android/view/SurfaceView.java

```
//viewRoot.pendingDrawFinished();
```

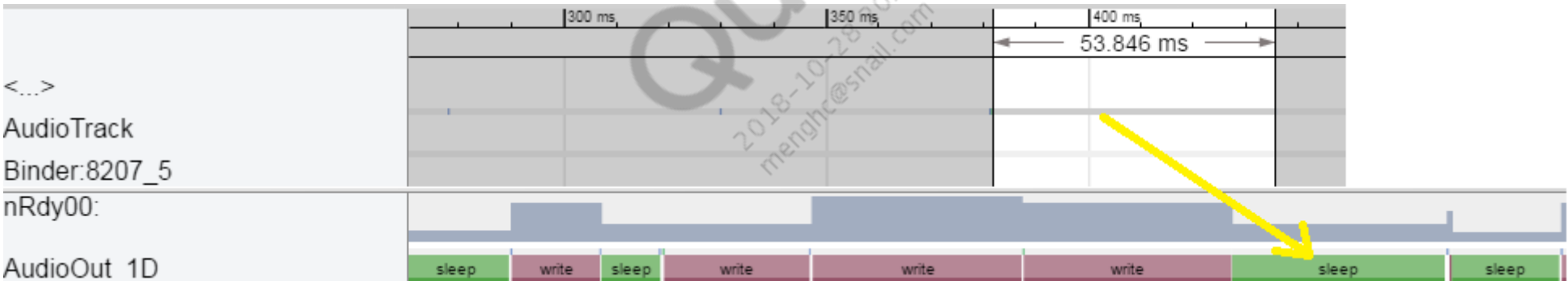
```
//viewRoot.drawPending();
```



Pop noise when playing com.huajiao live show in background

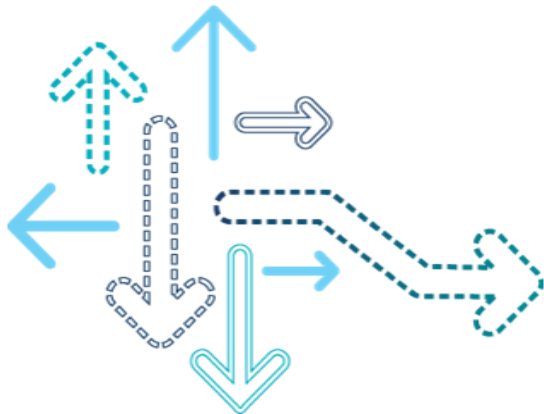
- Slack timer lead to long waking up latency
 - Slack timer is enabled since android-N but actually no works in android-N due to code logic
 - Slack timer works in android-o: when app is put to background, it's put into bg ground and latency caused by slack timer is high
- Suggestion/Workaround:
 - Reduce TIMER_SLACK_BG : system/core/libcutils/sched_policy.cpp

```
//#define TIMER_SLACK_BG 40000000    ---->
#define TIMER_SLACK_BG 5000000
```



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SDM670 Hardware Configuration

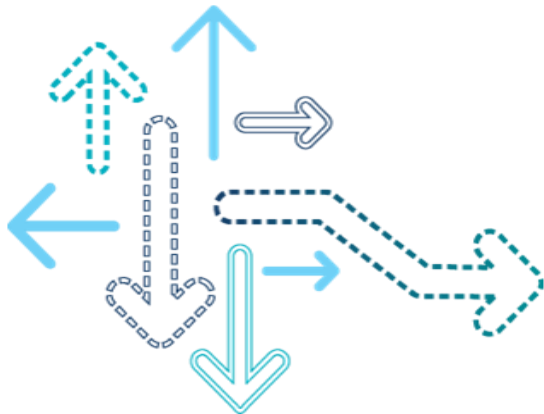


SDM670 Hardware Configuration vs sdm660

Features	SDM660	SDM670
CPU/L2 \$	<ul style="list-style-type: none">▪ Qualcomm® Kryo™ CPU (Kryo 260)<ul style="list-style-type: none">▪ Kryo Gold – Quad high-performance cores 2.2 GHz, L2 – 1 MB▪ Kryo Silver – Quad low-power cores 1.8 GHz, L2 – 1 MB	<ul style="list-style-type: none">▪ Qualcomm Kryo CPU (Kryo 360)<ul style="list-style-type: none">▪ Kryo Gold – Dual high-performance cores 2.2 GHz L2 cache per core – 256 KB▪ Kryo Silver – Hexa low-power cores 1.7 GHz, L2 cache per core – 128 KB L3 cache – 1 MB
GPU	Qualcomm® Adreno™ GPU 512 with Qualcomm® Snapdragon™ Universal Bandwidth Compression – 650 MHz, 272 KB GMEM	Adreno 615 with Snapdragon Universal Bandwidth Compression 2.0 – 430 MHz, 512 KB GMEM
Memory	2 × 16-bit LPDDR4/LPDDR4X 1866 MHz 6 GB and 8 GB	2 × 16-bit LPDDR4X 1866 MHz 6 GB and 8 GB
Display	1600 × 2560	1440 × 2880 (QHD+)
Governor	Interactive	SchedUtil

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SDM670 Performance Tuning Guide



Tuning Guide – predefined perflock(1) - App launching boost

Perf Hint ids:frameworks/base/core/java/android/util/BoostFramework.java

Parameters description	id
VENDOR_HINT_SCROLL_BOOST	0x00001080
VENDOR_HINT_FIRST_LAUNCH_BOOST	0x00001081
VENDOR_HINT_ANIM_BOOST	0x00001083
VENDOR_HINT_ACTIVITY_BOOST	0x00001084
VENDOR_HINT_TOUCH_BOOST	0x00001085
VENDOR_HINT_MTP_BOOST	0x00001086
VENDOR_HINT_DRAG_BOOST	0x00001087
VENDOR_HINT_PACKAGE_INSTALL_BOOST	0x00001088
VENDOR_HINT_FIRST_DRAW	0x00001042

Tuning Guide – predefined perflock(1) - App launching boost

/system/vendor/etc/perf/perfboostsconfig.xml

Parameters description(hint id: 0x00001081)	Opcode	Value
Timeout		2000ms
MPCTLV3_SCHED_BOOST	0x40C00000	1
MPCTLV3_MAX_FREQ_CLUSTER_BIG_CORE_0	0x40804000	0xFFF
MPCTLV3_MAX_FREQ_CLUSTER_LITTLE_CORE_0	0x40804100	0xFFF
MPCTLV3_MIN_FREQ_CLUSTER_BIG_CORE_0	0x40800000	1747
MPCTLV3_MIN_FREQ_CLUSTER_LITTLE_CORE_0	0x40800100	1516
MPCTLV3_CPUBW_HWMON_MIN_FREQ	0x41800000	1401
MPCTLV3_TOGGLE_POWER_COLLAPSE	0x40400000	0x01
MPCTLV3_STORAGE_CLK_SCALING_DISABLE	0x42C10000	0x01
MPCTLV3_LLCBW_HWMON_MIN_FREQ	0x43000000	0xFF
MPCTLV3_L3_MEMLAT_MIN_FREQ	0x43400000	0xFFF
MPCTLV3_GPU_DISABLE_GPU_NAP	0x4281C000	0x1

Tuning Guide – predefined perflock(1) - App launching boost

/system/vendor/etc/perf/perfboostsconfig.xml

Parameters description(hint id: 0x00001081)	Opcode	Value
Timeout		1500
MPCTLV3_TOGGLE_POWER_COLLAPSE	0x40400000	0x01
MPCTLV3_STORAGE_CLK_SCALING_DISABLE	0x42C10000	0x01
CPUBW_MIN_FREQ	0x41800000	59
MPCTLV3_LLCBW_HWMON_MIN_FREQ	0x43000000	806
MPCTLV3_L3_MEMLAT_MIN_FREQ	0x43400000	1190
MPCTLV3_GPU_DISABLE_GPU_NAP	0x4281C000	0x1

Tuning Guide – predefined perflock(1) - App launching boost(First activity launch)

/system/vendor/etc/perf/perfboostsconfig.xml

Parameters description(hint id: 0x00001081)	Opcode	Value
Timeout		15000
MPCTLV3_SCHED_BOOST	0x40C00000	0x03
SCHED_GROUP_DOWNMIGRATE_OPCODE	0x40C58000	95
SCHED_GROUP_UPMIGRATE_OPCODE	0x40C54000	100
LPM_BIAS_HYST_OPCODE	0x40408000	0x63

Tuning Guide – Predefined perflock(1) – Vertical Scroll boost

/system/vendor/etc/perf/perfboostsconfig.xml

Parameters description(hint id: 0x00001080)	Opcode	Value
Timeout		
CPUBW_MIN_FREQ	0x41800000	0x31
MPCTLV3_MIN_FREQ_CLUSTER_BIG_CORE_0	0x40800000	1100
MPCTLV3_MIN_FREQ_CLUSTER_LITTLE_CORE_0	0x40800100	1100
MPCTLV3_SCHED_BOOST	0x40C00000	2

Tuning Guide – Predefined perflock(1) – Horizontal Scroll boost

/system/vendor/etc/perf/perfboostsconfig.xml

Parameters description(hint id: 0x00001080)	Opcode	Value
Timeout		
CPUBW_MIN_FREQ	0x41800000	0x31
MPCTLV3_MIN_FREQ_CLUSTER_BIG_CORE_0	0x40800000	1100
MPCTLV3_MIN_FREQ_CLUSTER_LITTLE_CORE_0	0x40800100	1100
MPCTLV3_SCHED_BOOST	0x40C00000	2

Tuning Guide – Predefined perflock(1) – pre-fling

/system/vendor/etc/perf/perfboostsconfig.xml

Parameters description(hint id: 0x00001080)	Opcode	Value
Timeout		
CPUBW_MIN_FREQ	0x41800000	0x31
MPCTLV3_MIN_FREQ_CLUSTER_BIG_CORE_0	0x40800000	1100
MPCTLV3_MIN_FREQ_CLUSTER_LITTLE_CORE_0	0x40800100	1100
MPCTLV3_SCHED_BOOST	0x40C00000	2

Tuning Guide – predefined perflock(1) - MTP boost

/system/vendor/etc/perf/perfboostsconfig.xml

Parameters description(hint id: 0x00001086)	Opcode	Value
Timeout		0
MPCTLV3_SCHED_BOOST	0x40C00000	1
MPCTLV3_MAX_FREQ_CLUSTER_BIG_CORE_0	0x40804000	0xFFF
MPCTLV3_MAX_FREQ_CLUSTER_LITTLE_CORE_0	0x40804100	0xFFF
MPCTLV3_MIN_FREQ_CLUSTER_BIG_CORE_0	0x40800000	1747
MPCTLV3_MIN_FREQ_CLUSTER_LITTLE_CORE_0	0x40800100	1516
MPCTLV3_STORAGE_CLK_SCALING_DISABLE	0x42C10000	0x01

Tuning Guide – predefined perflock(1) – package installation

/system/vendor/etc/perf/perfboostsconfig.xml

Parameters description(hint id: 0x00001088)	Opcode	Value
Timeout		0
MPCTLV3_MAX_FREQ_CLUSTER_BIG_CORE_0	0x40804000	0xFFF
MPCTLV3_MAX_FREQ_CLUSTER_LITTLE_CORE_0	0x40804100	0xFFF
MPCTLV3_MIN_FREQ_CLUSTER_BIG_CORE_0	0x40800000	0xFFF
MPCTLV3_MIN_FREQ_CLUSTER_LITTLE_CORE_0	0x40800100	0xFFF

Tuning Guide – Scheduler Tunable(1)

sched_boost

Parameters description	Provide several boost value to satisfy kinds of scenario. Possible value could be 1: Full Throttle; 2: Conservative; 3: Restrained; 0: disable
location	/proc/sys/kernel/sched_boost
Suggestion	Full Throttle: Launch Boost case Conservative: Ux Scenarios like Scroll/fling Restrained: Extended Launch boost like for game loading
Usage:	Enhanced multiple sched boost levels for power/perf balance.
Impact	Help UX performance.

Tuning Guide – Scheduler Tunable(4)

sched_group_upmigrate

Parameters description	Task groups whose aggregate demand on a cpu is more than sched_group_upmigrate need to be upmigrated if possible
location	/proc/sys/kernel/sched_group_upmigrate
Default value	140
Usage:	Increase this threshold would prevent task upmigrating to big cores, benefit for power but hurt performance

Tuning Guide – Scheduler Tunable(5)

sched_group_downmigrate

Parameters description	Percentage. If Task group is up-migrated and will need to drop their aggregate demand to less than sched_group_downmigrate, scheduler will find best power efficient CPU that can accommodate the aggregate demand of the group.
location	/proc/sys/kernel/sched_group_downmigrate
Default value	120
Usage:	Decrease this threshold would prevent task downmigrating to little cores, benefit for performance but may impact power.

Tuning Guide – Interactive Governor Tunable(1)

hispeed_freq

Parameters description	Keep the CPU frequency at hispeed_freq (or above) for once cpu load is higher than hispeed_load
location	/sys/devices/system/cpu/cpu0/cpufreq/schedutil/hispeed_freq
Default value	1209600
Usage:	increase will get better performance

Tuning Guide – Interactive Governor Tunable(1)

hispeed_load

Parameters description	Keep the CPU frequency at hispeed_freq (or above) for once cpu load is higher than hispeed_load
location	/sys/devices/system/cpu/cpu0/cpufreq/schedutil/hispeed_load
Default value	90
Usage:	decreasing this will make cpufreq go up more aggressively

Appendix - 1: Kernel Configuration Must Remove

- CONFIG_LOG_BUF_MAGIC
- CONFIG_TASKSTATS
- CONFIG_TASK_DELAY_ACCT
- CONFIG_TASK_XACCT
- CONFIG_TASK_IO_ACCOUNTING
- CONFIG_CGROUP_DEBUG
- CONFIG_CLEANCACHE
- CONFIG_CMA_DEBUGFS
- CONFIG_PM_DEBUG
- CONFIG_L2TP_DEBUGFS
- CONFIG_SERIAL_MSM
- CONFIG_SERIAL_MSM_CONSOLE
- CONFIG_UID_SYS_STATS
- CONFIG_QCOM_GPI_DMA_DEBUG
- CONFIG_QCOM_CPUSS_DUMP
- CONFIG_MSM_CORE_HANG_DETECT
- CONFIG_MSM_GLADIATOR_HANG_DETECT
- CONFIG_ICNSS_DEBUG
- CONFIG_DYNAMIC_DEBUG
- CONFIG_PAGE_OWNER
- CONFIG_PAGE_OWNER_ENABLE_DEFAULT
- CONFIG_DEBUG_PAGEALLOC

CONFIG_SLUB_DEBUG
CONFIG_SLUB_DEBUG_PANIC_ON
CONFIG_DEBUG_PAGEALLOC_ENABLE_DEFAULT
CONFIG_PAGE_POISONING
CONFIG_DEBUG_OBJECTS
CONFIG_DEBUG_OBJECTS_FREE
CONFIG_DEBUG_OBJECTS_TIMERS
CONFIG_DEBUG_OBJECTS_WORK
CONFIG_DEBUG_OBJECTS_RCU_HEAD
CONFIG_DEBUG_OBJECTS_PERCPU_COUNTER
CONFIG_SLUB_DEBUG_ON
CONFIG_DEBUG_KMEMLEAK
CONFIG_DEBUG_KMEMLEAK_EARLY_LOG_SIZE=4000
CONFIG_DEBUG_KMEMLEAK_DEFAULT_OFF
CONFIG_DEBUG_STACK_USAGE
CONFIG_DEBUG_MEMORY_INIT
CONFIG_LOCKUP_DETECTOR
CONFIG_WQ_WATCHDOG
CONFIG_PANIC_ON_SCHED_BUG
CONFIG_PANIC_ON_RT_THROTTLING
CONFIG_SCHED_STACK_END_CHECK
CONFIG_DEBUG_SPINLOCK
CONFIG_DEBUG_MUTEXES
CONFIG_DEBUG_ATOMIC_SLEEP
CONFIG_DEBUG_LIST
CONFIG_FAULT_INJECTION
CONFIG_FAIL_PAGE_ALLOC
CONFIG_UFS_FAULT_INJECTION

CONFIG_FAULT_INJECTION_DEBUG_FS
CONFIG_FAULT_INJECTION_STACKTRACE_FILTER
CONFIG_QCOM_RTBB
CONFIG_QCOM_RTBB_SEPARATE_CPUS
CONFIG_FUNCTION_TRACER
CONFIG_IRQSOFF_TRACER
CONFIG_PREEMPT_TRACER
CONFIG_BLK_DEV_IO_TRACE
CONFIG_MEMTEST
CONFIG_PANIC_ON_DATA_CORRUPTION
CONFIG_MSM_CAMERA_DEBUG
CONFIG_MSMB_CAMERA_DEBUG
CONFIG_FB_MSM_MDSS_XLOG_DEBUG
CONFIG_MSM_SMD_DEBUG
CONFIG_IOMMU_DEBUG
CONFIG_IOMMU_TESTS
CONFIG_PREEMPT_TRACER
CONFIG_DEBUG_KMEMLEAK
CONFIG_DEBUG_SPINLOCK
CONFIG_DEBUG_BUS_VOTER
CONFIG_HAVE_DEBUG_KMEMLEAK
CONFIG_HAVE_DEBUG_BUGVERBOSE
CONFIG_QCOM_COMMON_LOG
CONFIG_QCOM_CPUSS_DUMP