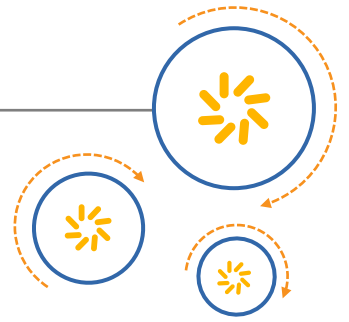




Qualcomm Technologies, Inc.



Performance Improvement Patches for Android Oreo Builds

80-P3936-3 A

November 6, 2017

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Revision history

Revision	Date	Description
A	November 2017	Initial release

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1 Introduction

1.1 Purpose

This document provides details about the system performance improvement patches on the Android Oreo release. It is intended for customers who are required to understand the Qualcomm Technologies, Inc. (QTI) performance improvement patches so as to achieve better performance on systems with QTI chipsets.

1.2 Conventions

The patches mentioned in each table are in the order of their applicability. It is similar to the *git log* where the most recent patch appears on top of the list. Patches must be applied from bottom to top.

1.3 Technical assistance

For assistance or clarification on information in this document, submit a case to QTI at <https://createpoint.qti.qualcomm.com/>.

If you do not have access to the CDMATech Support website, register for access or send email to support.cdmatech@qti.qualcomm.com.

2 Performance features

Performance optimization is a continuous process concurrent with software feature development to enable each MSM™ device to secure a quality level that is high enough for commercial release. To accomplish this on customer targets, QTI provides customers with performance improvement patches.

This chapter describes system performance patch information required for achieving system-level performance improvement. QTI recommends that customers apply all patches to their builds, especially those identified as mandatory, unless there are serious conflicts or code differences due to customizations.

2.1 System performance

2.1.1 Bionic

Module	Patch	MSM8998	MSM8996, MSM8996SG	MSM8937, MSM8917, MSM8940, MSM8920, SDM450	MSM8953	SDM660, SDM630, SDM636	MSM8976, MSM8976SG, MSM8956, MSM8952	MSM8909
Bionic	bionic_2044682	Yes	Yes	Yes	Yes	Yes	No	No
Bionic	bionic_1804504	No	No	No	No	No	No	Yes

2.1.2 Skia

Module	Patch	MSM8998	MSM8996, MSM8996SG	MSM8937, MSM8917, MSM8940, MSM8920, SDM450	MSM8953	MSM8909	SDM660, SDM630, SDM636	MSM8976, MSM8976SG, MSM8956, MSM8952
External/skia	skia_2044932	Yes	Yes	Yes	Yes	Yes	Yes	Yes

2.1.3 ART

Module	Patch	MSM8998	MSM8996, MSM8996SG	MSM8937, MSM8917, MSM8940, MSM8920, SDM450	MSM8953	MSM8909	SDM660, SDM630, SDM636	MSM8976, MSM8976SG, MSM8956, MSM8952
ART	art_1982657	Yes	Yes	Yes	Yes	Yes	Yes	Yes
ART	art_2006960	Yes	Yes	Yes	Yes	Yes	Yes	Yes

2.1.4 Scheduler

Module	Patch	MSM8996, MSM899SG	MSM8952, MSM8976, MSM8976SG, MSM8956	MSM8937, MSM8917, MSM8940, MSM8920, SDM450	MSM8953	MSM8909
Kernel	scheduler_1368299	Yes	No	Yes	Yes	Yes
Kernel	scheduler_1350969	Yes	No	Yes	Yes	Yes
Kernel	scheduler_1406492	Yes	No	Yes	Yes	Yes
Kernel	scheduler_1372948	Yes	No	Yes	Yes	Yes
Device/ qcom/ common	scheduler_1396473	Yes	No	Yes	Yes	Yes

Module	Patch	MSM8996, MSM899SG	MSM8952, MSM8976, MSM8976SG, MSM8956	MSM8937, MSM8917, MSM8940, MSM8920, SDM450	MSM8953	MSM8909
Kernel	scheduler_1406451	Yes	No	Yes	Yes	Yes
Kernel	scheduler_1466953	Yes	No	Yes	Yes	Yes
Kernel	scheduler_1474339	Yes	No	No	No	No

Module	Patch	MSM8998	SDM660, SDM636	SDM630
Kernel	scheduler_1680199	Yes	Yes	Yes
Kernel	scheduler_1696298	Yes	Yes	Yes
Kernel	scheduler_coreisol_1662200	Yes	Yes	No
Kernel	scheduler_1662199	Yes	Yes	Yes
Kernel	scheduler_1662198	Yes	Yes	Yes
Kernel	scheduler_core_isolation_1662193	Yes	Yes	No
Kernel	scheduler_core_isolation_1662192	Yes	Yes	No
Kernel	scheduler_core_isolation_1712019	Yes	Yes	No
Kernel	scheduler_1731990	Yes	Yes	Yes
Kernel	scheduler_1735665	Yes	Yes	Yes
Kernel	scheduler_1726412	Yes	Yes	Yes
Kernel	scheduler_1663933	Yes	Yes	Yes
Kernel	scheduler_1663934	Yes	Yes	Yes
Kernel	scheduler_1663935	Yes	Yes	Yes
Kernel	scheduler_1663936	Yes	Yes	Yes
Kernel	scheduler_1663937	Yes	Yes	Yes
Kernel	scheduler_1752991	Yes	Yes	Yes
Kernel	scheduler_1749208	Yes	Yes	Yes
Kernel	colocation_1749147	Yes	Yes	Yes
Kernel	core_isolat_1930545	Yes	Yes	Yes
Kernel	scheduler_1930544	Yes	Yes	Yes

2.1.5 Core isolation

Module	Patch	MSM8998	SDM660	SDM630
Kernel	core_isolation_1662204	Yes	Yes	No
Kernel	core_isolation_1667205	Yes	Yes	No
Kernel	core_isolation_1662203	Yes	Yes	No
Kernel	core_isolation_1662202	Yes	Yes	No
Kernel	core_isolation_1662197	Yes	Yes	No
Kernel	core_isolation_1662195	Yes	Yes	No
Kernel	core_isolation_1662194	Yes	Yes	No
Kernel	core_isolation_1682226	Yes	Yes	No
Kernel	core_isolation_1662191	Yes	Yes	No
Kernel	core_isolation_1662190	Yes	Yes	No
Kernel	core_isolation_1697440	Yes	Yes	No
Kernel	core_control_helper_1697441	Yes	Yes	No
Kernel	core_control_helper_1697442	Yes	Yes	No
Kernel	core_isolation_1731990	Yes	Yes	Yes

2.1.6 Cpusets

Module	Patch	MSM8998	SDM660, SDM636	SDM630
Kernel	cpusets_1703574	Yes	Yes	Yes
Kernel	cpusets_1687885	Yes	Yes	Yes
Kernel	cpusets_1688798	Yes	Yes	Yes
Vendor/qcom/ cobalt	cpusets_1709574	Yes	No	No
Vendor/qcom/ cobalt	cpusets_1689429	Yes	No	No
Vendor/qcom/ falcon_64	cpusets_1952891	No	Yes	Yes

2.1.7 Governor

Module	Patch	MSM8998	MSM8996, MSM8996SG	MSM8937, MSM8917, MSM8940, MSM8920, SDM450	MSM8953	SDM660, SDM636 SDM630	MSM8976, MSM8976SG, MSM8956, MSM8952	MSM8909
Kernel	governor_1354410	No	Yes	Yes	Yes	No	Yes	No
Kernel	governor_1396896	No	No	No	No	No	No	Yes
Kernel	governor_1405469	No	Yes	Yes	Yes	No	Yes	No
Kernel	governor_1406748	No	Yes	Yes	Yes	No	Yes	No
Kernel	kernel_1344990	No	No	No	No	No	No	No

Module	Patch	MSM8998	MSM8996, MSM8996SG	MSM8937, MSM8917, MSM8940, MSM8920, SDM450	MSM8953	SDM660, SDM636 SDM630	MSM8976, MSM8976SG, MSM8956, MSM8952	MSM8909
Device/ qcom/ common	governor_1348647	No	No	No	No	No	No	No
Device/ qcom/ common	governor_1361656	No	No	No	No	No	No	No
Kernel	kernel_1474374	No	No	No	No	No	No	No
Kernel	governor_1354410	Yes	No	No	No	Yes	No	No
Kernel	governor_1396896	Yes	No	No	No	Yes	No	No
Kernel	governor_1405469	Yes	No	No	No	Yes	No	No
Kernel	governor_1406748	Yes	No	No	No	Yes	No	No
Kernel	kernel_1829807	No	No	No	No	Yes	No	No

2.1.8 Power and thermal

Module	Patch	MSM8996, MSM8996SG	MSM8937, MSM8917, MSM8940, MSM8920, SDM450	MSM8953
Device/ qcom/ common	Power_Thermal_1373099	Yes	No	No
Kernel	Power_Thermal_1403874	Yes	No	No
Kernel	Power_Thermal_1403631	Yes	No	No

2.1.9 Bus DCVS v2

Module	Patch	MSM8996, MSM8996SG	MSM8937, MSM8917, MSM8940, MSM8920, SDM450	MSM8953
Device/ qcom/ common	DCVS_1593838	Yes	No	No
Kernel	DCVS_1353983	Yes	Yes	Yes
Kernel	DCVS_1353990	Yes	Yes	Yes
Kernel	DCVS_1353991	Yes	Yes	Yes
Kernel	DCVS_1353992	Yes	Yes	Yes
Kernel	DCVS_1353994	Yes	Yes	Yes

Module	Patch	MSM8996, MSM8996SG	MSM8937, MSM8917, MSM8940, MSM8920, SDM450	MSM8953
Kernel	DCVS_1354074	Yes	Yes	Yes
Device/ qcom/ common	DCVS_1352663	Yes	No	No
Kernel	DCVS_1394196	Yes	Yes	Yes

2.1.10 FDE

Module	Patch	MSM8998	SDM660, SDM630, SDM636	MSM8996, MSM8996SG	MSM8937, MSM8917, MSM8940, MSM8920, SDM450	MSM8953	MSM8976, MSM8976SG, MSM8956, MSM8952	MSM8909
Device/qcom/common	FDE_1375990	No	No	Yes	Yes	Yes	No	No
Vendor/ qcom/thulium	FDE_1368473	No	No	Yes	No	No	No	No
Frameworks/ base	FDE_1967953	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Device/qcom/common	FDE_1546158	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Kernel/ msm-3.18	FDE_1450397	No	No	Yes	Yes	Yes	No	No
Kernel/ msm-3.18	FDE_1457791	No	No	Yes	Yes	Yes	No	No
Platform/ system/vold	FDE_1967959	Yes	Yes	Yes	Yes	Yes	No	No

2.1.11 General system performance

Module	Patch	MSM8998	SDM660, SDM636, SDM630	MSM8996, MSM8996SG	MSM8937, MSM8917, MSM8940, MSM8920, SDM450	MSM8953
Kernel	system_1347498	No	No	Yes	Yes	Yes
Kernel	system_1374850	No	No	Yes	Yes	Yes
Kernel	system_1300431	No	No	Yes	Yes	Yes
Kernel	system_1364569	No	No	Yes	Yes	Yes
Kernel	system_1399854	No	No	Yes	Yes	Yes
Kernel	system_1411947	No	No	Yes	No	No
Kernel	system_1409016	No	No	Yes	No	No
Kernel	system_1366770	No	No	Yes	No	No
Kernel	performance_driver_1585741	No	No	No	No	No
Kernel	binder_1588309	No	No	No	No	No
Kernel	binder_1552656	No	No	No	Yes	Yes
Kernel	binder_1588310	No	No	No	No	No
Vendor/ qcom/ thulium	thulium_1581065	No	No	Yes	No	No

Device/qcom/common	cpusets_1952898	No	Yes	No	No	No
External/libjpeg-turbo	ux_benchmark_2056565	Yes	Yes	Yes	Yes	Yes
Vendor/qcom/falcon_64	user_quota_2041891	Yes	Yes	Yes	Yes	Yes
Vendor/qcom/thorium_64	user_quota_2038930	Yes	Yes	Yes	Yes	Yes
Device/qcom/common	core_ctl_20005173	Yes	Yes	No	Yes	No
Device/qcom/common	display_1546158	Yes	Yes	Yes	Yes	Yes

2.1.12 eMMC performance

Module	Patch	MSM8996, MSM8996SG	MSM8952, MSM8976, MSM8976SG, MSM8956	MSM8937, MSM8917, MSM8940,MS M8920, SDM450	MSM8953	MSM8976, MSM8976SG, MSM8956, MSM8952	MSM8909
Kernel	eMMC_perf_1457336	Yes	No	Yes	Yes	No	No
Kernel	eMMC_perf_1457332	Yes	No	Yes	No	No	No
Kernel	eMMC_perf_1457329	Yes	No	Yes	No	No	No
Kernel	eMMC_perf_1348618	No	Yes	No	No	Yes	No
Kernel	eMMC_perf_1413311	No	Yes	No	No	Yes	No

Module	Patch	MSM8996, MSM8996SG	MSM8952, MSM8976, MSM8976SG, MSM8956	MSM8937, MSM8917, MSM8940,MS M8920, SDM450	MSM8953	MSM8976, MSM8976SG, MSM8956, MSM8952	MSM8909
Kernel	eMMC_perf_1437195	No	Yes	No	No	Yes	No
Kernel	eMMC_perf_1487190	No	Yes	No	No	Yes	No
Kernel	eMMC_perf_1487185	No	Yes	No	No	Yes	No
Kernel	eMMC_perf_1490688	No	Yes	No	No	Yes	No

2.1.13 Performance and core-control modules

Module	Patch	MSM8996, MSM8996SG	MSM8937, MSM8917, MSM8940, SDM450	MSM8953
Kernel	msm_performance_1470968	No	Yes	No
Kernel	msm_performance_1499205	No	No	Yes
Kernel	msm_performance_1467176	Yes	Yes	Yes
Kernel	core_control_1463666	Yes	Yes	Yes
Kernel	core_control_1466953	Yes	Yes	Yes

2.1.14 Kernel

Module	Patch	MSM8996, MSM8996SG	MSM8909	MSM8937, MSM8917, MSM8940, MSM8920	MSM8953	MSM8976, MSM8976SG, MSM8956, MSM8952	MSM8909
Kernel	kernel_1372079	No	No	No	No	Yes	No
Kernel	vellamo_IPC_FIX_1377745	No	No	No	No	No	No
Kernel	kernel_1474344	No	No	No	No	Yes	No
Kernel	kernel_1471535	No	No	No	No	Yes	No
Kernel	kernel_1466425	No	No	No	No	No	No
Kernel	kernel_1471536	No	No	No	No	Yes	No
Kernel	kernel_1471537	No	No	No	No	Yes	No
Kernel	kernel_1471538	No	No	No	No	Yes	No

Module	Patch	MSM8998	SDM660	SDM630
Kernel	timers_1662189	Yes	Yes	Yes
Kernel	timers_1662188	Yes	Yes	Yes
Kernel	timers_1662187	Yes	Yes	Yes
Kernel	timers_1662186	Yes	Yes	Yes
Kernel	timers_1662185	Yes	Yes	Yes
Kernel	timers_1662183	Yes	Yes	Yes
Kernel	timers_1662182	Yes	Yes	Yes
Kernel	timers_1667204	Yes	Yes	Yes
Kernel	kernel_1731797	Yes	Yes	Yes
Kernel	kernel_1731964	Yes	Yes	Yes
Kernel	kernel_1736492	Yes	Yes	Yes
Kernel	kernel_1889111	No	Yes	Yes

2.1.15 GPU clock

Module	Patch	MSM8996, MSM8996SG	MSM8937, MSM8917, MSM8940, MSM8920, SDM450	MSM8953	MSM8976, MSM8976SG, MSM8956, MSM8952	MSM8909
Kernel	kernel_1474492	No	No	No	Yes	No
Kernel	kernel_1474493	No	No	No	Yes	No
Kernel	kernel_1472176	No	No	No	Yes	No
Kernel	kernel_1474377	No	No	No	Yes	No
Kernel	kernel_1523963	No	No	No	Yes	No
Kernel	kernel_1525292	No	No	No	Yes	No

2.1.16 SELINUX

Module	Patch	MSM8998	MSM8996, MSM8996SG	MSM8937, MSM8917, MSM8940, MSM8920, SDM450	MSM8953	MSM8952, MSM8976, MSM8976SG, MSM8956	MSM8909
Device/ qcom/ sepolicy	sepolicy_2061772	Yes	Yes	Yes	Yes	Yes	Yes
Device/ qcom/ sepolicy	sepolicy_2036272	Yes	Yes	Yes	Yes	Yes	Yes
Device/ qcom/ sepolicy	sepolicy_2030879	Yes	Yes	Yes	Yes	Yes	Yes
Device/ qcom/ sepolicy	sepolicy_2024216	Yes	Yes	Yes	Yes	Yes	Yes

Module	Patch	MSM8998	MSM8996, MSM8996SG	MSM8937, MSM8917, MSM8940, MSM8920, SDM450	MSM8953	MSM8952, MSM8976, MSM8976SG, MSM8956	MSM8909
Device/ qcom/ sepolicy	sepolicy_2010431	Yes	Yes	Yes	Yes	Yes	Yes
Device/ qcom/ sepolicy	sepolicy_2011562	Yes	Yes	Yes	Yes	Yes	Yes
Device/ qcom/se policy	sepolicy_2006776	Yes	Yes	Yes	Yes	Yes	Yes
Device/ qcom/se policy	sepolicy_2000253	Yes	Yes	Yes	Yes	Yes	Yes
Device/ qcom/se policy	sepolicy_1999425	Yes	Yes	Yes	Yes	Yes	Yes
Device/ qcom/ sepolicy	sepolicy_2001270	Yes	Yes	Yes	Yes	Yes	Yes
Device/ qcom/se policy	sepolicy_1992466	Yes	Yes	Yes	Yes	Yes	Yes
Device/ qcom/se policy	sepolicy_1987265	Yes	Yes	Yes	Yes	Yes	Yes
Device/ qcom/ sepolicy	sepolicy_1914113	Yes	Yes	Yes	Yes	Yes	Yes
Device/ qcom/se policy	iop_sepolicy_2050172	Yes	Yes	Yes	Yes	Yes	No

2.1.17 Benchmark performance improvement

Module	Patch	MSM8996, MSM899SG	MSM8952, MSM8976, MSM8976SG, MSM8956	MSM8937, MSM8917, MSM8940, MSM8920, SDM450	MSM8953	MSM8998	SDM660, SDM636, SDM630
Kernel	sdcard_1524065	No	Yes	No	No	No	No
Kernel	sdcard_1292805	Yes	No	Yes	Yes	No	No
Kernel	sdcard_1370211	No	No	No	No	No	No
Kernel	sdcard_1524066	No	Yes	No	No	No	No
Kernel	sdcard_1320604	Yes	NO	Yes	Yes	No	No
Kernel	sdcard_1524067	No	Yes	No	No	No	No
Kernel	sdcard_1382044	No	Yes	No	No	No	No
Kernel	sdcard_1524068	No	Yes	No	No	No	No
Kernel	sdcard_1524069	No	Yes	No	No	No	No
System/ core	sdcard_2044884	Yes	Yes	Yes	Yes	Yes	Yes

2.1.18 Predictive LPM

Module	Patch	MSM8998	SDM660	SDM630
Kernel	lpm_1676867	Yes	Yes	Yes
Kernel	lpm_1676868	Yes	Yes	Yes
Kernel	lpm_1676869	Yes	Yes	Yes
Kernel	lpm_1676870	Yes	Yes	Yes
Kernel	lpm_1676871	Yes	Yes	Yes
Kernel	lpm_1751178	Yes	Yes	Yes

2.2 Performance binary

The performance binary encapsulates all proprietary patches and improves the performance of key software components. Performance of components such as the Dalvik virtual machine, Android framework, system libraries are improved. When linked to the performance binary, the code is further optimized and runs efficiently on Qualcomm® Snapdragon™ processors. To integrate the performance binary, pick up the binary from the tip of *vendor/qcom/proprietary/prebuilt_HY11*.

2.3 PerfLock API

Module	Patch	MSM8998	SDM660, SDM636, SDM630	MSM8996, MSM8996SG	MSM8952, MSM8976, MSM8976SG, MSM8956	MSM8937, MSM8917, MSM8940, MSM8920, SDM450	MSM8953	MSM8909
Vendor/qcom/ thulium	perf_hal_1950047	No	No	Yes	No	No	No	No
Device/qcom/ common	Qperformance.jar_1999010	Yes	Yes	Yes	Yes	Yes	Yes	Yes
vendor/qcom/ cobalt	perf_hal_1912703	Yes	No	No	No	No	No	No
Vendor/qcom/ thulium	perf_hint_1899654	No	No	Yes	No	No	No	No
Vendor/qcom/ cobalt	power_hint_1975997	Yes	No	No	No	No	No	No
Vendor/qcom/ cobalt	power_hint_2065412	Yes	No	No	No	No	No	No

Module	Patch	MSM8998	SDM660, SDM636, SDM630	MSM8996, MSM8996SG	MSM8952, MSM8976, MSM8976SG, MSM8956	MSM8937, MSM8917, MSM8940, MSM8920, SDM450	MSM8953	MSM8909
Vendor/qcom/ cobalt	power_ hint_20 52426	Yes	No	No	No	No	No	No
Vendor/qcom/ cobalt	perf_hin t_20241 14	No	No	No	No	No	No	No
Vendor/qcom/ tellurium_32	perf_hal _19933 21	No	No	No	Yes	No	No	No
Vendor/qcom/ tellurium_64	perf_hal _19933 18	No	No	No	Yes	No	No	No
Vendor/qcom/ thorium_32	perf_HA L_1959 536	No	No	No	No	Yes	No	No
Vendor/qcom/ thorium_32	power_ hint_19 23048	No	No	No	No	Yes	No	No
Vendor/qcom/ thorium_64	perf_hal _19500 92	No	No	No	No	Yes	No	No
Vendor/qcom/ titanium_32	perf_hal _19501 06	No	No	No	No	No	Yes	No
Vendor/qcom/ titanium_64	perf_hal _19501 13	No	No	No	No	No	Yes	No
Vendor/qcom/ titanium_64	perf_hin t_19229 27	No	No	No	No	No	Yes	No

Module	Patch	MSM8998	SDM660, SDM636, SDM630	MSM8996, MSM8996SG	MSM8952, MSM8976, MSM8976SG, MSM8956	MSM8937, MSM8917, MSM8940, MSM8920, SDM450	MSM8953	MSM8909
Vendor/qcom/ ferrum	perf_hal_1950162	No	No	No	No	No	No	Yes

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2.4 User experience performance

2.4.1 Boot time optimizations

Module	Patch	MSM8996, MSM8996SG	MSM8952, MSM8976, MSM8976SG, MSM8956	MSM8937, MSM8917, MSM8940, MSM8920, SDM450	MSM8953
Kernel	Boot_1300161	Yes	No	Yes	Yes
Kernel	Boot_1276293	No	No	No	No
Kernel	Boot_1267142	No	Yes	No	No
Kernel	Boot_1421166	Yes	No	No	No
Device/ qcom/ common	Boot_1627278	Yes	No	No	No
Device/ qcom/ common	boot_1520839	No	Yes	No	No
Vendor/ qcom/ tellurium_64	boot_1520840	No	Yes	No	No
Vendor/ qcom/ tellurium_32	boot_1521292	No	Yes	No	No
Kernel	boot_1520841	No	Yes	No	No
Device/ qcom/ common	boot_1532549	No	Yes	No	No
Device/ qcom/ common	boot_1532537	Yes	No	Yes	Yes
Kernel	boot_1523881	No	Yes	No	No

Module	Patch	SDM660	SDM630
Kernel	charger_1865968	Yes	Yes
Vendor/qcom/ falcon_64	boot_1860631	Yes	Yes
Vendor/qcom/ falcon_32	boot_1860632	Yes	Yes

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2.4.2 Application launch latency and scroll FPS framework

Module	Patch	MSM8998	MSM8996, MSM8996SG	MSM8952, MSM8976, MSM8976SG, MSM8956	MSM8937, MSM8917, MSM8940, MSM8920, SDM450	MSM8953	SDM660, SDM636	SDM630
Frameworks/ base	binder_gc_2044893	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Frameworks/ base	boost_framework_1932806	Yes	Yes	Yes	Yes	Yes	No	No
Kernel	Memlat_1898778	No	No	No	No	No	No	Yes
Frameworks/ base	activity_trigger_1928723	Yes	No	Yes	No	No	Yes	Yes
Frameworks/ base	activity_trigger_1970093	No	Yes	No	Yes	Yes	No	No
Frameworks/ base	iop_boost_1977679	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Frameworks/ base	precise_activity_boost_2060396	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Frameworks/ base	mtp_boost_1994856	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Frameworks/ base	perflock_2060346	Yes	Yes	Yes	Yes	Yes	Yes	Yes

2.4.3 General UX performance

Module	Patch	MSM8998	SDM660, SDM636, SDM630	MSM8996, MSM8996SG	MSM8952, MSM8976, MSM8976SG, MSM8956	MSM8937, MSM8917, MSM8940, MSM8920, SDM450	MSM8953
Kernel	UX_1428308	No	No	Yes	No	No	No
Kernel	UX_1391317	No	No	Yes	No	No	No
Kernel	UX_1523923	No	No	Yes	No	No	No
Kernel	UX_1552641	No	No	Yes	No	Yes	Yes
Kernel	UX_1552656	No	No	Yes	No	Yes	Yes
Kernel	UX_1409015	No	No	Yes	No	No	No
Kernel	UX_1479990	No	No	Yes	No	Yes	Yes
Kernel	UX_1436362	No	No	Yes	No	No	No
Kernel	UX_1572892	No	No	Yes	No	Yes	Yes
Kernel	UX_1562955	No	No	Yes	No	Yes	Yes
Libcore	UX_XML_BENCHMARK_1702381	No	NO	Yes	Yes	Yes	Yes
Device/qcom/ common	waker_wake_e_2040788	No	Yes	No	No	No	No
Device/qcom/ common	waker_wake_e_2055516	No	No	Yes	No	No	Yes

Module	Patch	MSM8998	SDM660	SDM630
Kernel	Game_exit_latency_1924369	No	Yes	Yes

2.4.4 Graphics HWUI parameters

Module	Patch	MSM8996, MSM8996SG	MSM8952, MSM8976, MSM8976SG, MSM8956	MSM8937, MSM8917, MSM8940, MSM8920, SDM450	MSM8953
Vendor/qcom/titanium	hwui_1503605	No	No	No	Yes
Vendor/qcom/tellurium_64	hwui_1448079	No	Yes	No	No
Vendor/qcom/thorium	hwui_1532428	No	No	Yes	No

Module	Patch	MSM8998	SDM660	SDM630
vendor/qcom/ falcon_64	hwui_1866149	No	Yes	No
vendor/qcom/ falcon_32	hwui_1875292	No	Yes	No
Vendor/qcom/ cobalt	hwui_2019709	Yes	No	No

2.4.5 Vcard import improvement

Module	Patch	MSM8998	SDM660, SDM636, SDM630	MSM8996, MSM8996SG	MSM8952, MSM8976, MSM8976SG, MSM8956	MSM8937, MSM8917, MSM8940, MSM8920, SDM450	MSM8953
frameworks/ opt/vcard	VCARD_IMPORT_1980242	Yes	Yes	Yes	Yes	Yes	Yes

2.4.6 Lib GUI

Module	Patch	MSM8998	SDM660, SDM636, SDM630	MSM8996, MSM8996SG	MSM8952, MSM8976, MSM8976SG, MSM8956	MSM8937, MSM8917, MSM8940, MSM8920, SDM450	MSM8953
frameworks/ native	libgui_2034813	Yes	Yes	Yes	Yes	Yes	Yes

2.5 Memory optimization

Module	Patch	MSM8996, MSM8996SG	MSM8952, MSM8976, MSM8976SG, MSM8956	MSM8937, MSM8917, MSM8940, MSM8920 SDM450	MSM8953
Kernel	Memory_1339534	Yes	No	No	No
Kernel	Memory_1385683	No	No	No	Yes
Kernel	Memory_1519958	No	No	Yes	No
Kernel	Memory_1053743	No	No	No	No
Kernel	Memory_842836	No	No	No	No
Kernel	Memory_1126049	No	Yes	No	No
Vendor/ qcom/ thulium	Memory_1327763	Yes	No	No	No
Device/ qcom/ common	Memory_1427887	Yes	No	No	No

Module	Patch	MSM8996, MSM8996SG	MSM8952, MSM8976, MSM8976SG, MSM8956	MSM8937, MSM8917, MSM8940, MSM8920 SDM450	MSM8953
Device/ qcom/ common	memory_1296209	No	Yes	No	No
Device/ qcom/ common	memory_1445623	No	Yes	No	No
Kernel	LMK_1385667	Yes	No	Yes	Yes
Kernel	LMK_1625763	No	No	No	No
Kernel	LMK_1436882	No	No	No	No
Kernel	LMK_1385363	No	Yes	No	No
Kernel	ALMK_1385364	No	Yes	No	No
Kernel	ALMK_1436883	No	No	No	No
Kernel	ALMK_1625761	No	No	No	No
Kernel	ALMK_185668	Yes	No	Yes	Yes
kernel	PPR_1301926	No	Yes	No	No
Kernel	PPR_1385682	Yes	No	Yes	Yes
Kernel	PPR_1316992	No	No	No	No
Device/ qcom/ common	memory_1480853	No	No	Yes	No

Module	Patch	MSM8996, MSM8996SG	MSM8952, MSM8976, MSM8976SG, MSM8956	MSM8937, MSM8917, MSM8940, MSM8920 SDM450	MSM8953
Kernel	memory_1489544	Yes	No	Yes	Yes
Kernel	memory_1489545	Yes	No	Yes	Yes
Kernel	memory_1477808	Yes	No	Yes	Yes

2.5.1 Zcache feature and ZRAM

Module	Patch	MSM8998	SDM660, SDM636, SDM630	MSM8996, MSM8996SG	MSM8952, MSM8976, MSM8976SG, MSM8956	MSM8937, MSM8917, MSM8940, MSM8920, SDM450	MSM8953
Kernel	memory_1499730	No	No	No	No	Yes	Yes
Device/qcom/ sepolicy	memory_1534961	Yes	Yes	Yes	Yes	Yes	Yes
Frameworks/ base	perf_prop_1934284	Yes	Yes	Yes	Yes	Yes	Yes
Vendor/qcom/ falcon_64	zram_fix_2039201	No	Yes	No	No	No	No
Vendor/qcom/ thorium	perf_prop_1942646	Yes	Yes	Yes	Yes	Yes	Yes
Device/qcom/ common	zcache_cleanup_1956079	Yes	Yes	Yes	No	Yes	Yes

2.5.2 Memory features

Module	Patch	MSM8996, MSM8996SG	MSM8952, MSM8976, MSM8976SG, MSM8956	MSM8937, MSM8917, MSM8940, MSM8920, SDM450	MSM8953
Device/ qcom/ sepolicy	sepolicy_1642792	Yes	Yes	Yes	Yes
Device/ qcom/ common	ALMK_PR_1661629	No	Yes	No	No
Device/ qcom/ common	ALMK_PR_1642788	Yes	No	Yes	Yes
Device/ qcom/ common	ALMK_PR_1661628	No	No	No	No
Kernel	ALMK_PR_1642774	Yes	No	Yes	Yes
Kernel	ALMK_PR_1665570	No	No	No	No
Kernel	ALMK_PR_1665575	No	Yes	No	No
Device/ qcom/ common	ZRAM_1620408	No	No	No	No
Device/ qcom/ common	ZRAM_1620397	No	Yes	No	No
Device/ qcom/ common	ZRAM_1620373	No	No	No	No

Module	Patch	MSM8996, MSM8996SG	MSM8952, MSM8976, MSM8976SG, MSM8956	MSM8937, MSM8917, MSM8940, MSM8920, SDM450	MSM8953
Device/ qcom/ sepolicy	sepolicy_1658769	Yes	Yes	Yes	Yes
Device/ qcom/ common	memory_postboot_1641372	No	No	No	No
Kernel	ALMK_1625759	No	No	No	No
Kernel	ALMK_1207712	No	No	No	No
Kernel	ALMK_1180054	No	Yes	No	No
Kernel	ALMK_1385662	Yes	No	Yes	Yes
Device/qcom/ common	memory_features_1994807	No	Yes	No	No
Device/qcom/ sepolicy	sepolicy_2081755	No	No	Yes	Yes
Device/qcom/ sepolicy	sepolicy_2080768	No	No	Yes	Yes
System/core	toolbox_2080749	No	No	Yes	Yes

Module	Patch	MSM8998	SDM660	SDM630
Kernel	lmk_1903955	Yes	Yes	Yes
Kernel	lmk_1853063	Yes	Yes	Yes
Kernel	lmk_1895020	Yes	Yes	Yes
Vendor/qcom/ falcon_64	swiotlb_1860455	Yes	Yes	Yes

2.5.3 SWAP memory region

Module	Patch	MSM8996, MSM8996SG	MSM8952, MSM8976, MSM8976SG, MSM8956	MSM8937, MSM8917, MSM8940, MSM8920, SDM450	MSM8953
Device/qcom/ common	ZRAM_SWAP_1942688	No	No	Yes	No

2.5.4 Memory compaction

Module	Patch	MSM8998	SDM660	SDM630
Kernel	compaction_1590833	Yes	Yes	Yes
Kernel	compaction_1590834	Yes	Yes	Yes
Kernel	compaction_1590835	Yes	Yes	Yes
Kernel	compaction_1590840	Yes	Yes	Yes
Kernel	compaction_1590853	Yes	Yes	Yes

2.5.5 ALMK v3

Module	Patch	MSM8998	SDM660	SDM630
Device/qcom/ common	almkv3_1805767	No	Yes	No
Kernel	almkv3_1785347	No	Yes	No

3 Critical bug fixes

3.1 Scheduler bug fix

Module	Patch	MSM8996, MSM8996SG	MSM8952, MSM8976, MSM8976SG, MSM8956	MSM8937, MSM8917, MSM8940, MSM8920, SDM450	MSM8953
Kernel	scheduler _1336618	Yes	No	Yes	Yes
Kernel	scheduler _1340646	Yes	No	Yes	Yes
Kernel	scheduler _1474339	No	Yes	No	No
Kernel	scheduler _1306556	Yes	No	Yes	Yes
Kernel	scheduler _1350974	Yes	No	No	No
Kernel	scheduler _1311937	Yes	No	No	Yes
Kernel	scheduler _1311938	Yes	No	Yes	Yes
Kernel	scheduler _1311939	Yes	No	No	Yes
Device/ qcom/ common	scheduler _1351034	Yes	No	No	No

3.2 Governor bug fix

Module	Patch	MSM8996, MSM8996SG	MSM8952, MSM8976, MSM8976SG, MSM8956	MSM8937, MSM8917, MSM8940, MSM8920, SDM450	MSM8953
Kernel	governor_ 1377560	Yes	No	Yes	Yes
Kernel	governor_ 1377772	Yes	No	Yes	Yes
Kernel	governor_ 1386604	Yes	No	Yes	Yes
Device/ qcom/ common	governor_ 1403591	Yes	No	No	No

A References

A.1 Related documents

Title	Number
Qualcomm Technologies, Inc.	
<i>Performance Improvement Patches for Android Nougat Builds</i>	80-P3936-2