

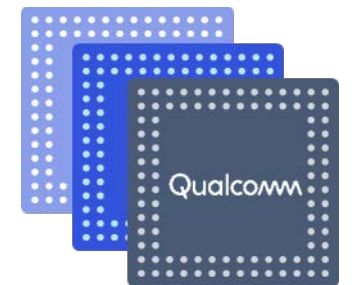
# SDM670/SDM710 Android Performance Overview

80-PD126-30 Rev. D

**Confidential and Proprietary – Qualcomm Technologies, Inc.**

**NO PUBLIC DISCLOSURE PERMITTED:** Please report postings of this document on public servers or websites to: [DocCtrlAgent@qualcomm.com](mailto:DocCtrlAgent@qualcomm.com).

**Restricted Distribution:** Not to be distributed to anyone who is not an employee of either Qualcomm Technologies, Inc. or its affiliated companies without the express approval of Qualcomm Configuration Management.



# Confidential and Proprietary – Qualcomm Technologies, Inc.

---

Qualcomm  
2018-07-30 19:38:19 PDT  
songpeng2@huaiqin.com

**Confidential and Proprietary – Qualcomm Technologies, Inc.**

**NO PUBLIC DISCLOSURE PERMITTED:** Please report postings of this document on public servers or websites to: [DocCtrlAgent@qualcomm.com](mailto:DocCtrlAgent@qualcomm.com).

**Restricted Distribution:** Not to be distributed to anyone who is not an employee of either Qualcomm Technologies, Inc. or its affiliated companies without the express approval of Qualcomm Configuration Management.

Not to be used, copied, reproduced, or modified in whole or in part, nor its contents revealed in any manner to others without the express written permission of Qualcomm Technologies, Inc.

All Qualcomm products mentioned herein are products of Qualcomm Technologies, Inc. and/or its subsidiaries.

Qualcomm, Kryo, and Adreno are trademarks of Qualcomm Incorporated, registered in the United States and other countries. Other product and brand names may be trademarks or registered trademarks of their respective owners.

This technical data may be subject to U.S. and international export, re-export, or transfer (“export”) laws. Diversion contrary to U.S. and international law is strictly prohibited.

Qualcomm Technologies, Inc.  
5775 Morehouse Drive  
San Diego, CA 92121  
U.S.A.

© 2017–2018 Qualcomm Technologies, Inc. and/or its subsidiaries. All rights reserved.

# Revision History

Revision	Date	Description
A	September 2017	Initial release
B	November 2017	Updated Slide 6 with the Fmax value
C	April 05, 2018	Document updated to align with the SDM710 and SDM670 CS details and configuration; read in entirety
D	April 16, 2018	Numerous changes were made to this document; it should be read in its entirety

# Contents

---

- Hardware Features – SDM660 vs. SDM670 vs. SDM710
- Performance Improvements
- SDM670/SDM710 CPU Benchmarks
- References
- Questions?

Qualcomm  
2018-07-30 19:38:19 PDT  
songpeng2@huagiqin.com

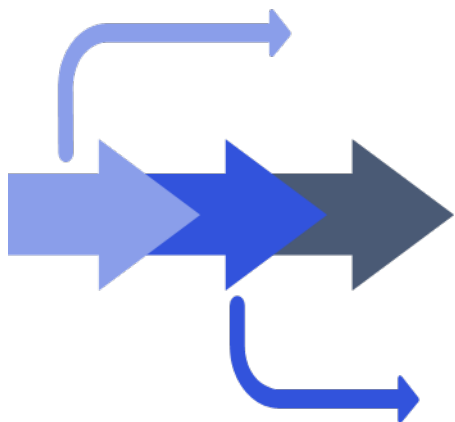


## Hardware Features – SDM660 vs. SDM670 vs. SDM710

---

# Hardware Features – SDM660 vs. SDM670 vs. SDM710

Feature	SDM660	SDM670	SDM710
CPU/L2 \$	<ul style="list-style-type: none"> <li>Qualcomm® Kryo™ CPU (Kryo 260) <ul style="list-style-type: none"> <li>Kryo Gold – Quad high-performance cores 2.2 GHz, L2 – 1 MB</li> <li>Kryo Silver – Quad low-power cores 1.8 GHz, L2 – 1 MB</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Kryo CPU (Kryo 360), L3 cache – 1 MB <ul style="list-style-type: none"> <li>Kryo Gold – Dual high-performance cores 2.0 GHz, L2 cache per core – 256 KB</li> <li>Kryo Silver – Hexa low-power cores 1.7 GHz, L2 cache per core – 128 KB</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Kryo CPU (Kryo 360), L3 cache – 1 MB <ul style="list-style-type: none"> <li>Kryo Gold – Dual high-performance cores 2.2 GHz, L2 cache per core – 256 KB</li> <li>Kryo Silver – Hexa low-power cores 1.7 GHz, L2 cache per core – 128 KB</li> </ul> </li> </ul>
GPU	Qualcomm® Adreno™ GPU 512 with Qualcomm® Universal Bandwidth Compression – 650 MHz, 272 KB GMEM	Adreno GPU 615 with Qualcomm Universal Bandwidth Compression 2.0 – 430 MHz, 512 KB GMEM	Adreno GPU 616 with Qualcomm Universal Bandwidth Compression 2.0 – 500 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	2 × 16-bit LPDDR4X 1866 MHz 6 GB and 8 GB
Display	1600 × 2560	FHD+	QHD+
Governor	Interactive	SchedUtil	SchedUtil



## Performance Improvements

---

# Hardware Performance Improvements from SDM660

---

- **SDM670:**
  - Kryo 360 CPU with Fmax of 2.0 GHz with 1 MB L3 cache and 10 nm FinFET process
  - GPU is upgraded to Adreno GPU 615 with Fmax of 430 MHz
  - Display engine is improved to Adreno DPU 775
- **SDM710:**
  - Kryo 360 CPU with Fmax of 2.2 GHz with 1 MB L3 cache and 10 nm FinFET process
  - GPU is upgraded to Adreno GPU 616 with Fmax of 500 MHz
  - Display engine is improved to Adreno DPU 775



# Software Performance Improvement Features

---

- ARM EAS-Z scheduler
  - SDM670/SDM710 chipsets use ARM EAS-Z scheduler extensions with QTI zone scheduler features
    - Ensures simpler and efficient software maintenance from a scheduler perspective
  - The following zone scheduler features are added on EAS:
    - Colocation
    - Frequency aggregation
    - Core isolation and core control
    - Enhanced task placement
    - New task differentiation

# Software Performance Improvement Features (cont.)

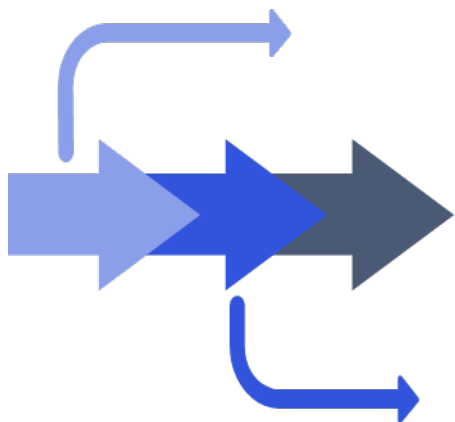
---

- SchedUtil governor
  - Scheduler events-driven dynamic clock and voltage scaling (DCVS) governor
  - Light-weight DCVS governor tightly coupled with EAS
    - Designed to work in tandem with the scheduler
  - Sets the frequency based on the load reported by the scheduler
  - Integrates the following QTI zone value-add features for power and performance parity or improvement:
    - Frequency aggregation
    - Go high-speed frequency
    - Task differentiation
    - Predictive DCVS

# Software Performance Improvement Features (cont.)

---

- I/O C-groups
  - Provides an infrastructure to configure I/O parameters for a set of tasks in a C group
  - Improves the APP launches where I/O activity consumes time
- Learning framework
  - Improves user experience (UX) scenarios
  - Collects data for use cases and arrives at optimal settings for multiple use cases
    - All optimal settings for multiple use cases are stored in a database on the device which is continuously updated and applied for all future occurrences of the profiled use cases
  - Improves the launch latencies

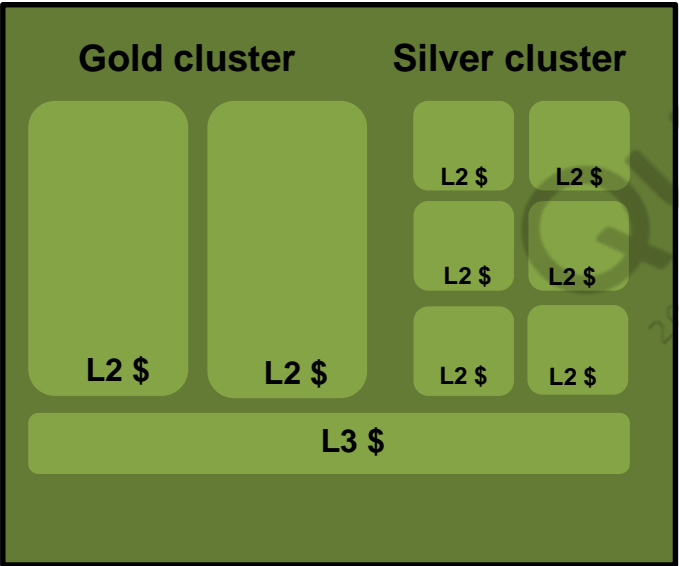


Qualcomm  
2018-03-30 19:38:19 PDT  
songpen@qualcomm.com

## SDM670/SDM710 CPU Benchmarks

---

# SDM670/SDM710 CPU – Kryo 360



- **High-performance Kryo 360 CPU**  
Estimated 10% to 30% improvement in performance
- **Two big CPU cores and six little CPU cores**  
Optimized for performance and power efficiency
- **Improvement in DoU and battery life**  
10 nm process node in SDM670/SDM710 vs. 14 nm in SDM660

# Performance Dashboard

---

- See the *Performance Dashboard for SDM710.LA.1.0 Linux Android Release (80-PE565-5A)* document for reference performance dashboard of SDM710/SDM670.

Qualcomm  
2018-07-30 19:38:19 PDT  
songpeng2@huawei.com

# References

Documents	
Title	Number
Qualcomm Technologies, Inc.	
SDM670 Device Specification	80-PB873-1
SDM710 Device Specification	80-PG301-1
Energy Aware Scheduling and SchedUtil Overview	80-P9301-86
SDM660/SDA660 Device Specification	80-P7747-1
Performance Dashboard for SDM710.LA.1.0 Linux Android Release	80-PE565-5A

Acronyms	
Acronym or term	Definition
DCVS	Dynamic clock and voltage scaling
DDR	Double data rate
GPU	Graphics processing unit
UBWC	Universal bandwidth compression
UX	User experience



Qualcomm  
2018-07-30 19:38:19 PDT  
songpeng2@huawei.com

## Questions?

<https://createpoint.qti.qualcomm.com>

---