Adreno GPU Compute
IWOCL 2015
A Worldwide Leader in Mobile Technologies

- 29 Years of wireless innovation
- 15+ Billion chips shipped
- $3.4 Billion in R&D in FY2013
- 84,000+ Patents
- $120 Billion market cap

Source: Qualcomm Technologies, Inc. data
SoCs with embedded GPUs Q3 2014

Source: Jon Peddie Research, December 09, 2014

<table>
<thead>
<tr>
<th>Supplier</th>
<th>Market Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMD</td>
<td>0.0%</td>
</tr>
<tr>
<td>Apple</td>
<td>13%</td>
</tr>
<tr>
<td>Intel</td>
<td>3%</td>
</tr>
<tr>
<td>MediaTek</td>
<td>23%</td>
</tr>
<tr>
<td>Nvidia</td>
<td>1%</td>
</tr>
<tr>
<td>Samsung</td>
<td>4%</td>
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<tr>
<td>QTI</td>
<td>42%</td>
</tr>
<tr>
<td>Others</td>
<td>14%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>100.0%</td>
</tr>
</tbody>
</table>
Commercial Products with OpenCL Support

- HTC Droid DNA
- LG Optimus G
- Motorola Moto X, Droid Mini
- Sony Xperia ZL, Tablet Z
- Samsung GALAXY S4
- HTC One, One Max
- LG G Pad, Optimus
- Amazon Fire TV
- HTC Desire
- Motorola Moto E
- LG G3
- LG Watch Urbane
- Samsung GALAXY S5
- HTC One(M8), Desire Eye
- LG G3
- Sony Xperia Z2, Z3
- Samsung GALAXY Tab S
- LG G Pro 2
- Sony Xperia Z1S
- Samsung GALAXY Note 4, Edge
- HTC One M, Desire 820
- LG G Flex
- Sony Xperia Z4 Tablet

2013
- Snapdragon S4 Pro
- Snapdragon 600

2014 - 2015
- Snapdragon 400
- Snapdragon 410
- Snapdragon 800
- Snapdragon 801
- Snapdragon 805
- Snapdragon 810
- Snapdragon 615

OpenCL 1.1 Embedded
OpenCL 1.2 Full
GPU Compute Accelerated Computer Vision

- **Accelerated FastCV**
  - OpenCL(GPU), DSP and NEON acceleration
- **Deep Convolutional Neural Networks**
- **High Quality 3D Scanning: Model and Texture Mapping**

- **360 Degree Bird-Eye View**
  - Demoed in CES 2015
  - 30 FPS on GPU

- Fish-eye unwrap
- Perspective transform
Real time Video Post-Processing Demo

- **Video conferencing**
  - Hide details on background
  - Video stream compression

- **Not feasible without GPU Compute**
  - 33 FPS on GPU Accelerated
  - 17 FPS on 4-Core NEON CPU

- The demo implements background subtraction using local-binary-pattern descriptors that are integrated with a custom refinement algorithm and contour filtering.

- Understanding CPU and GPU architecture and **device specific optimization techniques** is a key for getting to top performance levels and creating new user experiences with OpenCL.
OpenCL Tools for Snapdragon

**DEVELOP**
- Snapdragon™ OpenCL Software Development Guide
- Advanced OpenCL Tutorials

**DEBUG**
- On-device OpenCL Debugger

**PROFILE / TUNE**
- OpenCL Profiler
- OpenCL Kernel Analyzer

Find these in Adreno SDK on developer.qualcomm.com

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OpenCL Product Differentiation

- It’s a perfect time to **start differentiating your product** with using GPU Compute on Snapdragon!
  - Significant performance improvement and power reduction
  - New user experiences which are not feasible to implement without using GPU Compute
  - Set of all required profiling, debugging tools and development platforms is available to help you with *reducing time-to-market*

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How to Start?

1. ✓ Order Snapdragon development boards on intrinsyc.com

2. ✓ Download our SDK and Programming Guide developer.qualcomm.com

   ✓ For all other GPGPU related questions, e-mail to arthurn@qti.qualcomm.com