Qualcomm® Snapdragon™
430 processor

3G/LTE Summit

September 14–16, 2015
Hong Kong
670+ operators in 181 countries are investing in LTE

422 LTE networks have launched in 143 countries

Source: GSA, Jul. '15
Smartphone Penetration - Emerging Economies

By 2020, 12 of the top 15 smartphone regions will be emerging economies.

Source: GSMA Intelligence

2010

30% of the world’s population covered by LTE network at the end of 2014

63% of the world’s population will be covered by 4G-LTE networks by end of 2020

2014

3 in 5 global 4G-LTE connections in 2020 will come from developing regions, up from around 3 in 10 in 2014, largely driven by LTE growth in China

Source: Strategy Analytics, GSMA Intelligence
Chinese smartphone use

Top 4 consumer usage map to ~90% of smartphone use cases

Source: GMAIntelligence
Snapdragon processor tiers

**Snapdragon 800**
Premium tier mobile computing devices, including smartphones and tablets

**Snapdragon 600**
High tier smartphones and tablets

**Snapdragon 400**
Medium tier and high volume smartphones and tablets

**Snapdragon 200**
High volume smartphones and tablets
Snapdragon 430

Multi-core performance

Octa core in the 400 tier, delivering higher multi-threaded performance

Advanced camera

Dual ISP delivering rich image quality and feature set

Qualcomm® Adreno™ graphics

First Adreno 500 series in the tier, delivering high-end features

Smooth FHD 1080p

Full HD display support at 60 FPS for a smooth and fluid UI
Driving smartphone growth globally

Key value propositions

• Mainstream full HD (1080p) 60fps smooth UI
• Integrated X6 LTE with 2x10 carrier aggregation
• 21MP, dual camera use cases
• Full HD (1080p) capture and playback with hardware HEVC
• Designed for leading performance for high-volume smartphones and tablets
• Adreno 505 PC-class graphics, with support for OpenGL ES 3.1
• Support for next-gen Qualcomm RF360™ front-end solution (Gen 2)
• Qualcomm® Reference Design (QRD) with support for Qualcomm® Global Pass solution

Qualcomm RF360 is a product of Qualcomm Technologies, Inc. Qualcomm Reference Design is a program of Qualcomm Technologies, Inc. Qualcomm Global Pass is a solution of Qualcomm Technologies, Inc.
Snapdragon 430

- Memory: 4+4 lane 21MP
- ISP: WNR
- X6 LTE: Cat 4 2x10 MHz
- Adreno Display: Qualcomm Hexagon™ 536 DSP
- Adreno Video: HEVC
- Adreno 505 GPU: FHD
- CPU: Octa Cortex-A53

Qualcomm Hexagon is a product of Qualcomm Technologies, Inc.
Snapdragon 430 platform

Codec
- WCD

Transceiver
- WTR

RF
- QFE
- QPA

PMIC
- PMI

NFC
- NQ

Wi-Fi
- WCN
Snapdragon 430 with X6 LTE
Integrated Cat 4 downlink with 2x10MHz CA

Integrated X6 LTE Modem
• Downlink: Cat 4 LTE (up to 150 Mbps)
• Up to 2x10 MHz carrier aggregation
• Support for Uplink data compression
• Multi-mode/multi-band 7 mode support
• LTE FDD, LTE TDD, UMTS, EV-DO, 1x, GSM, TD-SCDMA

Next Gen RF and Qualcomm RF360
• Next Gen Transceiver (WTR2965) and Qualcomm RF360
Uplink data compression (UDC)
Innovative modem-driven solution for additional uplink gains

Compresses all uplink TCP/UDP headers and data
X6 LTE Modern **Compress**

Fewer bits transmitted in uplink channel

Decompress

Increases network capacity in the uplink
Reduces interference, especially at cell edge
Transparent to both lower layers and apps

**Compression Gains**

<table>
<thead>
<tr>
<th>Application</th>
<th>Compression Gain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Video Streaming</td>
<td>79%</td>
</tr>
<tr>
<td>Web browsing</td>
<td>70%</td>
</tr>
<tr>
<td>App Chat</td>
<td>65% 55%</td>
</tr>
</tbody>
</table>

- Fewer bits transmitted in uplink channel
- Video Streaming: 79%
- Web browsing: 70%
- App: 65%
- Chat: 55%
Snapdragon 430: Wi-Fi

WCN 3680B

802.11ac with MU-MIMO

Benefits
• Peak rate 433Mbps download
• Optimized platform for power and performance
• Pin-to-Pin compatible with WCN 3660B

What’s new
• 802.11ac Wi-Fi
• Bluetooth Smart (4.1)
• Software and hardware optimized for Snapdragon
Video: LTE Wi-Fi Call Continuity
Snapdragon 430: multimedia

**What’s new**
- HEVC

**Benefits**
- Hardware decode (faster playback)
- Use less data
- Smaller file sizes at same video quality
Snapdragon 430: Adreno 505

Benefits
• More realistic scenes and objects for graphics and mobile gaming experiences at lower power
• Saves memory bandwidth

What’s new
• Latest API support
  • DirectX 12
  • OpenCL 2.0 full (GPU)
  • OpenGL 3.1 & Android Extension Pack
  • Geometry Shading & GPU Tessellation
• 64-bit Virtual Addresses

No Tessellation

Tessellation
Owners want quality pictures

56% Believe camera quality is very/extremely important in influencing their next smartphone selection.

Source: GSMA Intelligence

Top 5 Camera Capabilities Influencing SP Purchase

<table>
<thead>
<tr>
<th>Rank</th>
<th>Feature</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Auto-Focus</td>
<td>35%</td>
</tr>
<tr>
<td>2</td>
<td>Fast Auto-Focus</td>
<td>28%</td>
</tr>
<tr>
<td>3</td>
<td>Low-Light Shooting Mode</td>
<td>28%</td>
</tr>
<tr>
<td>4</td>
<td>Image Stabilization</td>
<td>28%</td>
</tr>
<tr>
<td>5</td>
<td>Digital Zoom</td>
<td>27%</td>
</tr>
</tbody>
</table>
Smartphones are the most used cameras

**Device Usage**

- **Smartphone Only Owner**: 94%
- **DSLR Owner**: 61%
- **Point & Shoot Owner**: 67%

**Smartphone owners take smartphone pictures at least weekly**

- **94%**

**Top Smartphone Camera Advantages**

1. Easy to share: 77%
2. Convenience: 76%
3. Easy to use: 75%
4. Portability: 72%
5. Software/apps: 53%
6. On device editing: 46%

Source: GSMA Intelligence
Snapdragon 430: Camera

**What’s new**

- Dual Camera - 21 MP
- 1080p30, 720p60, 480p120 video capture
- Enhanced A/F Performance
- HW Local Tone Mapping enhances Imaging & Video Dynamic Range
- GPU / DSP post-processing

**Benefits**

- Sensor tuning compatibility with SD618/SD620
- Fast responsiveness and throughput of images means less lag during capture of larger photos for mainstream phones
Mr. Thananan Vilailuck
i-Mobile
Dual camera

two cameras on its back side -- one for regular image - capturing and another for recording of the depth of the image
Snapdragon 430: sensor engine

What’s new
• Fast power collapse and restore
• Tightly coupled cache/memory for low-power and real-time operation

Benefits
• Reduced power consumption—offloads AP
• Always on use cases
• Saves cost—eliminates need for external hub

Tap to wake  Pedometer  Smart case
Snapdragon 430: Display

What's new
• Primary FHD 1920x1200 60 FPS UI
• Qualcomm® EcoPix™ and Qualcomm® TruPalette™ camera features

Benefits
• High-quality display for smooth FHD
• Enhanced display quality and power savings

FHD (1920x1200)
720p
Qualcomm® improveTouch™ technology

Creating the next generation touch experience

Highlights

• Combines improveTouch AFE with Snapdragon processing
• Best-in-class SNR (60dB) & interference immunity (20Vpp)
• Advanced water rejection and wet multi-finger tracking
• Ultra low power mode and wake-on features
• Passive stylus and gloved touch
• Fast frame rate (300 fps) and reduced latency

Benefits

• Improved UX and advanced algorithms
• Object detection and classification
• Enables context awareness and sensor fusion
• Superior cost to performance ratio
• Reduces development time
Video: improve Touch
Voice influences smartphone selection

67% of smartphone owners make voice calls at least daily.

Experiences influencing next smartphone selection

1. Clear voice calls in a noisy environment
   - T2B Importance: 85%

2. As natural as in person voice calls
   - T2B Importance: 77%

3. Louder/clearer speakerphone
   - T2B Importance: 77%

4 out of 5 owners are influenced by better call experiences.

Source: GSMA Intelligence
Snapdragon 430: Audio
Enhancing the user experience

Voice call
Hear and be heard
• Crystal clear VoLTE w/ EVS
• Reduce background sound with Fluence™
  noise cancelling technology
• Bandwidth extension for consistent HD Voice
• Active Noise Cancellation (ANC)

Music playback
Hear music the way musicians intended
• High fidelity playback
  • 24bit/192kHz
  • Improved THD+N & SNR w/ WCD9326
• Low power w/ DSP-offload
  • FLAC, APE, ALAC, AIFF

Natural interaction
Use audio to seamlessly interact
• Always on, low power voice activation

Camcorder
Capture what you want to hear
• 5.1 audio to go along w/ HD/4k video
• Record what the camera sees, cancel out everything else

Entertainment on-the-go
Immersive video and gaming w/ audio
• Loud playback w/ WSA smart amps
  • includes speaker protection
• Surround sound over stereo speakers
• Easy post-processing differentiation
  • Integrated Dolby and DTS
  • Hexagon Access Program

Fluence is a product of Qualcomm Technologies, Inc.
Hexagon 536 DSP

What’s new

• Hexagon 536 — dedicated multimedia DSP
• Expansion of use cases beyond voice and audio

Benefits

• Increased efficiency compared to CPU
• DSP performance and power saving features in more use cases

Image enhancement  Video  Sensors  Computer Vision
QRD: A comprehensive suite of deliverables
Streamlines and accelerates device commercialization from design to point of sale

**Design**
- BOM: component enablement
- HW design
- HW schematics PCBA, mechanical ID
- Product lifecycle approach for global sales seasons and portfolio mix

**Development**
- Comprehensive phone SW
- Tools, testing, documentation
- HW component ecosystem
- SW vendor ecosystem

**Commercialization**
- Regional SW for global opportunities
- Modem configurations
- Field testing
- Flexible inventory management
- Go-to-market biz dev
QRD Platform Offering

**Hardware**
- Global RF supporting China All-mode + SIME (SEA, India, MEA, Europe)
  - China & Export SKUs

**QRD SW**
- Qualcomm® Snapdragon™ Pic+ feature
- Audio: Qualcomm® Snapdragon™ Audio+ feature with bass boost, reverb, virtualizer
- Voice: Qualcomm® Snapdragon™ Voice+ with dual mic noise cancellation and volume boost
- Fluence: Snapdragon voice activation, keyword wake up and application launching
- Display: Sunlight visibility improvement (SVI)
- Video: Snapdragon transport accelerator (STA)
- IMS: VoLTE/V2LTE integrated with dialer and phone book

Up to 12 week estimated savings in device commercialization with Global Pass

Qualcomm Snapdragon Pic+, Qualcomm Snapdragon Voice+ and Qualcomm Snapdragon Audio+ are products of Qualcomm Technologies, Inc.
Global Pass—Designed to speed commercialization

Addressing challenges to help reduce development time

- Local business relationships
- Languages
- Access point names
- In-country network configuration
- Customer feature requests
- GMS certification
- In-country testing and validation

- Business critical relationships
- Expanded language support for 14 languages
- Regional APN settings
- Regional network configurations
- Software packages designed to address customer features
- In-region (outside of China) Android testing pre CS
- Field testing and technical acceptance support

Up to 12 week savings in device commercialization
Thank you

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For more information, visit us at:
www.qualcomm.com & www.qualcomm.com/blog

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## Snapdragon 430 feature set

<table>
<thead>
<tr>
<th>Feature</th>
<th>Snapdragon 212</th>
<th>Snapdragon 412</th>
<th>Snapdragon 430</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Package</strong></td>
<td>12x11.1 mm non-PoP</td>
<td>14x12.1 mm non-PoP</td>
<td>12x14 mm non-PoP</td>
</tr>
<tr>
<td><strong>CPU</strong></td>
<td>Quad Core 4xA7 @ 1.1GHz – 1.3GHz</td>
<td>Quad Core 4xA53 @ 1.2GHz</td>
<td>Octa Core 4xA53 @ 1.2GHz, 4xA53 @ 1.0GHz</td>
</tr>
<tr>
<td><strong>Memory</strong></td>
<td>1x533MHz LPDDR2/3</td>
<td>1x533MHz LPDDR2/3</td>
<td>1x32 800MHz LPDDR3</td>
</tr>
<tr>
<td><strong>Modem+Nav.</strong></td>
<td>LTE CAT 4, 2x10 CA</td>
<td>LTE Cat 4</td>
<td>LTE CAT 4, 2x10 CA</td>
</tr>
<tr>
<td><strong>App DSP</strong></td>
<td>Shared w/ Modem DSP</td>
<td>Shared w/ Modem DSP</td>
<td>Hexagon v56 256KB</td>
</tr>
<tr>
<td><strong>GPU/APIs</strong></td>
<td>Adreno 304 HD @ 60fps</td>
<td>Adreno 306 HD @ 60fps</td>
<td>Adreno 505 1920x1200@ 60fps</td>
</tr>
<tr>
<td></td>
<td>OpenGL ES 3.0</td>
<td>OpenGL ES 3.0</td>
<td>OpenGL ES 3.1+ AEP</td>
</tr>
<tr>
<td><strong>Display Resolution</strong></td>
<td>720p 60fps UI</td>
<td>1280x800 60fps UI + 720p30</td>
<td>1920x1200 60fps UI + 1080p30</td>
</tr>
<tr>
<td><strong>Interface</strong></td>
<td>DSI 4 lanes</td>
<td>DSI 4 lane</td>
<td>Dual DSI 4 lanes</td>
</tr>
<tr>
<td><strong>Camera Performance</strong></td>
<td>8MP@30ZSL</td>
<td>13MP@30 ZSL, JPEG, WNR, SW PDAF</td>
<td>16MP@30 ZSL, WNR, Enhanced AF, LTM, JPEG, HW PDAF</td>
</tr>
<tr>
<td><strong>Interface</strong></td>
<td>CSI 2+1 lanes</td>
<td>CSI: 4+2 lane</td>
<td>CSI2: 4+4 lanes</td>
</tr>
<tr>
<td>Feature</td>
<td>Snapdragon 212</td>
<td>Snapdragon 412</td>
<td>Snapdragon 430</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-----------------------------------------</td>
<td>-----------------------------------------</td>
<td>-----------------------------------------</td>
</tr>
<tr>
<td><strong>Video</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decode</td>
<td>1080p 30fps: HEVC, H.264, VP8</td>
<td>1080p30 H264, VP8</td>
<td>1080p 30fps: HEVC, H.264, VP8</td>
</tr>
<tr>
<td><strong>Audio</strong></td>
<td>Integrated (PM8916/8909)</td>
<td>Integrated PM8916</td>
<td>Integrated (PM8937)</td>
</tr>
<tr>
<td>Interface</td>
<td>I2S</td>
<td>I2S</td>
<td>I2S, SLIMBus</td>
</tr>
<tr>
<td>Audio</td>
<td>HD Audio</td>
<td>HD Audio</td>
<td>HD Audio, SVA</td>
</tr>
<tr>
<td>Voice</td>
<td>Wideband, Fluence</td>
<td>Superwideband (PS), Wideband, Fluence v5, HD and “AlwaysHD”</td>
<td>Superwideband (PS), Wideband, Fluence v6, HD and “AlwaysHD”</td>
</tr>
<tr>
<td><strong>Sensor</strong></td>
<td>CPU based</td>
<td>CPU based</td>
<td>ADSP based</td>
</tr>
<tr>
<td><strong>Storage</strong></td>
<td>eMMC 4.5</td>
<td>eMMC4.5</td>
<td>eMMCh5.1</td>
</tr>
<tr>
<td><strong>Peripherals</strong></td>
<td>1xUSB 2.0</td>
<td>1xUSB2.0</td>
<td>1xUSB 2.0</td>
</tr>
<tr>
<td><strong>Security</strong></td>
<td>Qualcomm® SecureMSM™ technology, Qualcomm® Snapdragon StudioAccess™ content protection technology, CPZ</td>
<td>SecureMSM, Snapdragon StudioAccess, CPZ</td>
<td>SecureMSM ARM, Snapdragon StudioAccess with CPZ for GPU</td>
</tr>
<tr>
<td><strong>BT/WLAN/FM</strong></td>
<td>802.11b/g/n, BT/FM</td>
<td>802.11b/g/n, BT/FM</td>
<td>802.11b/g/n/ac, BT/FM</td>
</tr>
<tr>
<td><strong>PMIC</strong></td>
<td>PM8909/PM8916</td>
<td>PM8916</td>
<td>PM8937 + PM8937</td>
</tr>
</tbody>
</table>

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