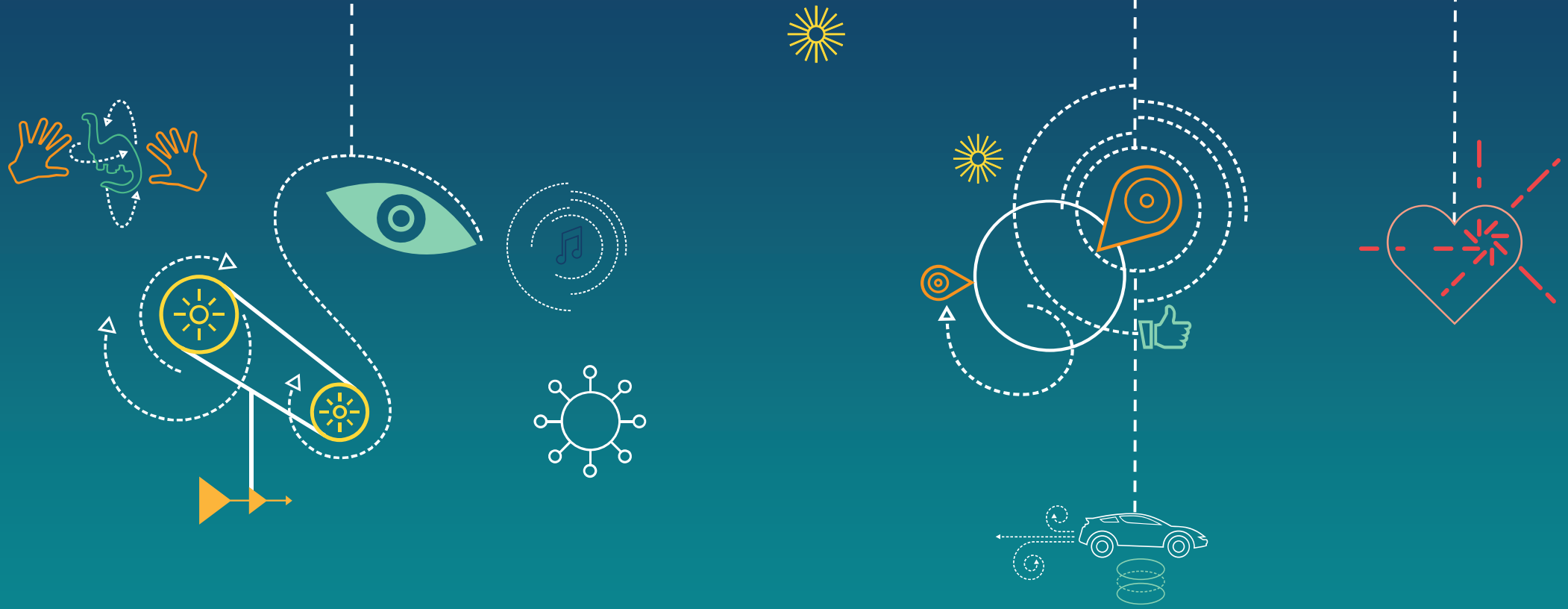


QUALCOMM®

Anand Chandrasekher
Chief Marketing Officer, Qualcomm Incorporated

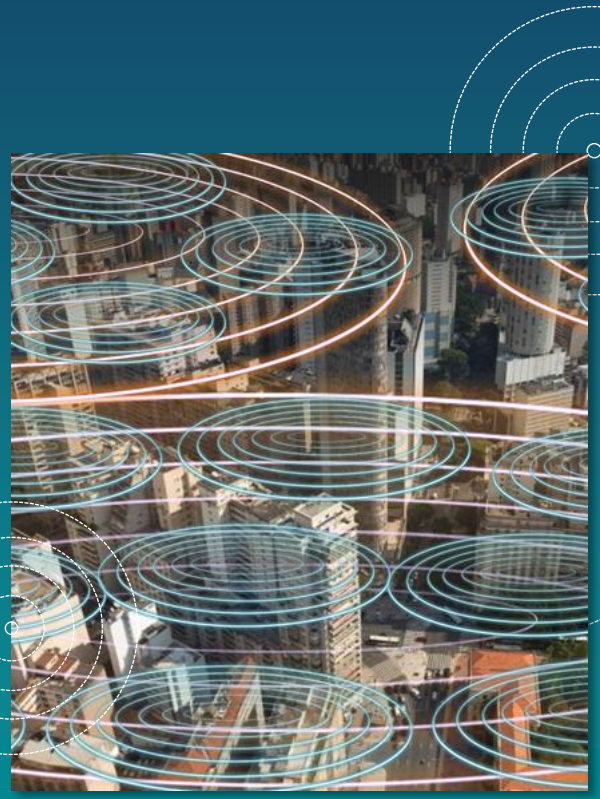
How mobile is redefining computing

QUALCOMM®

@achandrasekher
#nextinmobile

Key industry trends driving innovation

Redefining computing

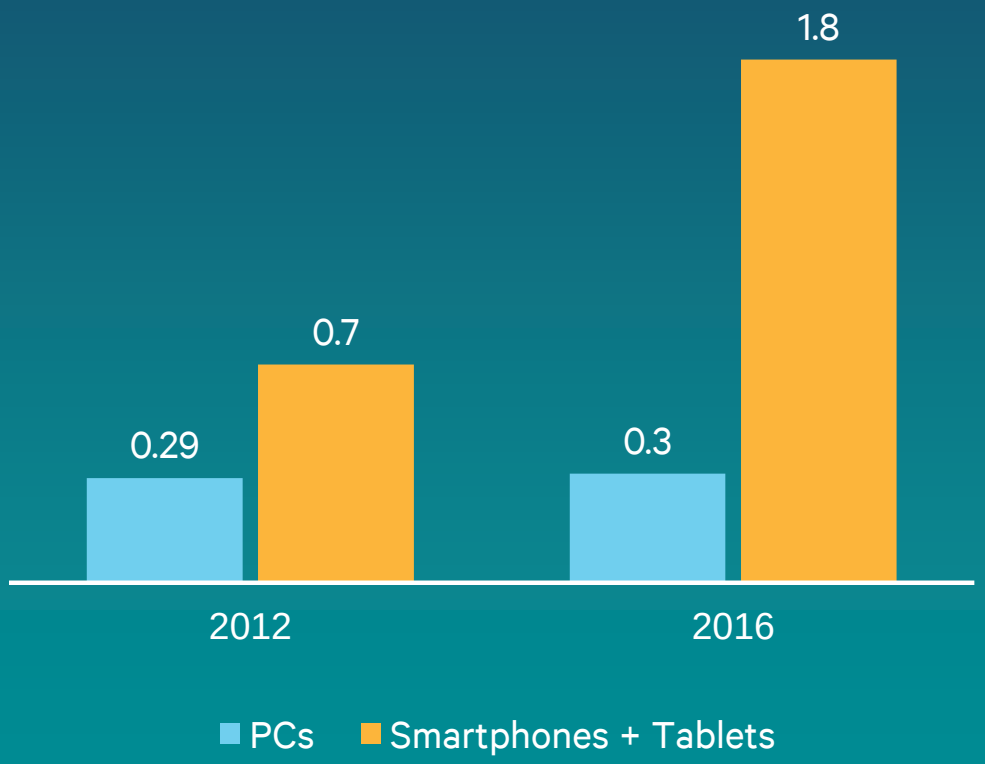


The 1000x data challenge

Digital 6th sense

A new era: mobile drives growth in computing

Device shipments (in billions)



Semiconductor revenues

Mobile devices		PCs
$68B	2012	$51B
$90B	2016	$56B

Source: Smartphones units: Avg of Gartner, Mar-13 & SA, Mar-13 ; Tablet units: Avg of Gartner, Mar-13 & SA, Apr-13; PC units (desktop + portable): Avg of Gartner, Mar-13 & IDC, Feb13; Semiconductor revenue: Gartner, Dec. '12; Mobile devices include mobile phones and tablets.

Expanding areas for smartphone innovation

CPU

2MB L2 (8064 only)
aSMP
Custom krait
Web Tech innovations
High performance floating point
Custom system interconnect

GPU

FlexRender™ technology
GPGPU compute for imaging/video
(Renderscript, OpenCL, LLVM)
Unified shader architecture
Low power innovations
Stereoscopic rendering
Accelerated WebGL
Profiling tools

DSP/Multimedia

21 MPix
20x digital zoom
Zero shutter lag
Ultrasound
7.1 surround playback
5.1 surround camcorder
Stereo 3D video
1080p HD video
Browser with HTML5 and 1080p flash
Computational camera
Noise cancellation

Modems

Coexistence with connectivity
VoLTE/SRVCC
Advanced receivers
Power optimization
LTE world mode
LTE broadcast
LTE TDD
RF multi-band
TD-SCDMA

Connectivity

Coexistence with WWAN
Indoor location
GPS/GNSS
.11ac
BT
Miracast
Multiband
FM

Sensors

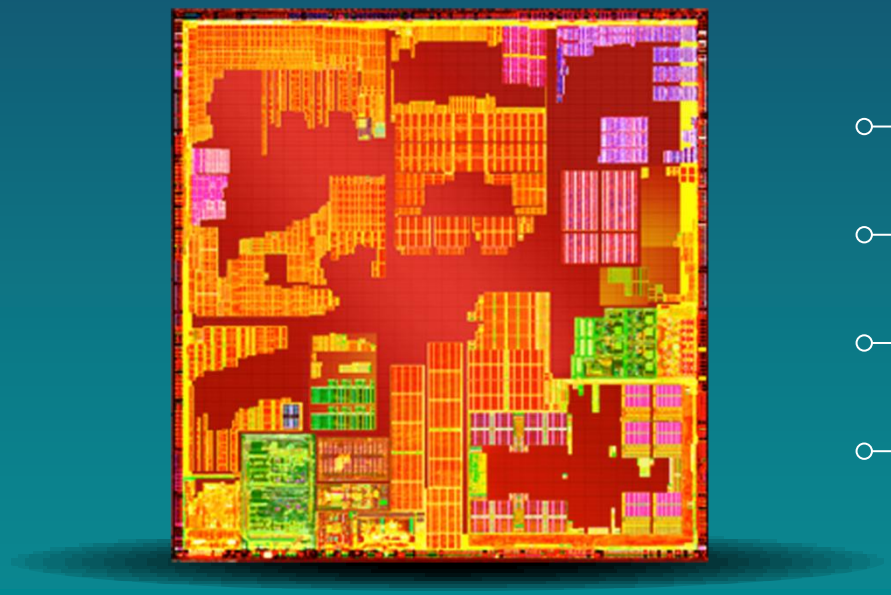
Accelerometer
Proximity
Pressure
Ambient light
Gestures
Temperature
Gyroscope
IR sensing
Humidity
Magnetometer

Displays

Color correction
Content adaptive backlight
Frame buffer compression
3D
Wireless display
MEMS

Strategy

Drive smartphone leadership into adjacent opportunities



- Set the design point
- Own the key technology blocks
- Integration
- Scale – deployment and ability to invest

A full platform solution for the new era of computing

- Leading hardware
- Drivers & optional advanced features software
- High level operating system
- Qualcomm® reference designs
- Enabling technologies
- HW & SW development tools & customer support

Qualcomm is a mobile native

We lead the industry we co-created after decades of investment and experience

#1

- 3G/4G/LTE
- RF
- AP
- GPU
- DSP

Sources: Mobile AP Unit Shipment - Strategy Analytics; GPU Shipment - Jon Peddi Research; DSP shipment - Forward Concepts; 3G/4G/LTE - Strategy Analytics; RF iSuppli, Q1'12

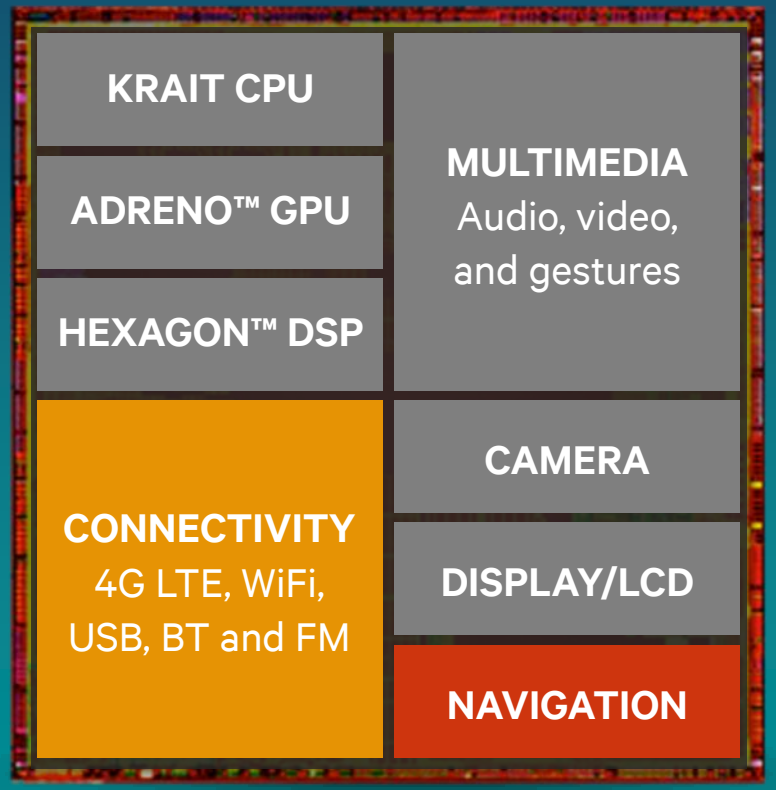
3G / 4G LTE

Years ahead in LTE

3rd generation LTE

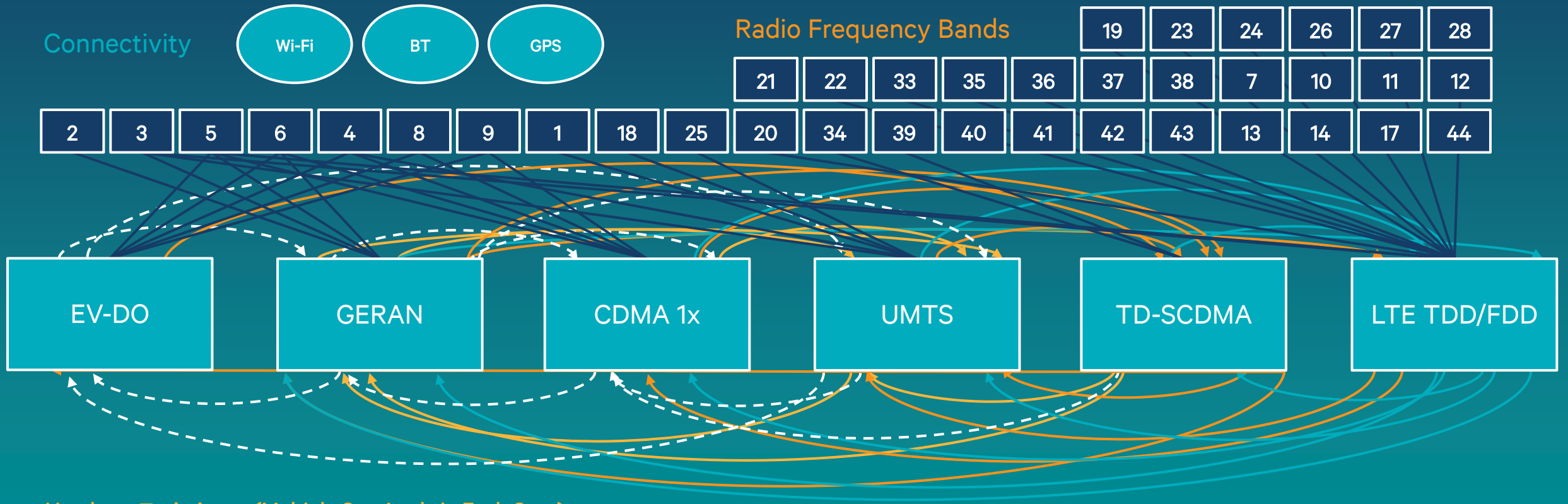
World-mode: supporting 7 cellular modes

Qualcomm® RF360 Front End Solution for global LTE designs



The unique Qualcomm advantage

Hiding the complexity underneath the most seamless mobile connectivity



Handover Techniques (Multiple Can Apply in Each Case)

System Selection
Blind Redirection
Redirection w/ Measurements
Reselection
PS Handover
CS Fallback
CSFB w/ SI Tunneling
Single Radio VCC

Handover Combinations (Hypothetical Examples)

LTE →

2G/3G →

Qualcomm Gobi is a product of Qualcomm Technologies Inc.

Qualcomm RF360 Front End Solution

The First Truly Global Solution for 4G LTE Devices

Advantages

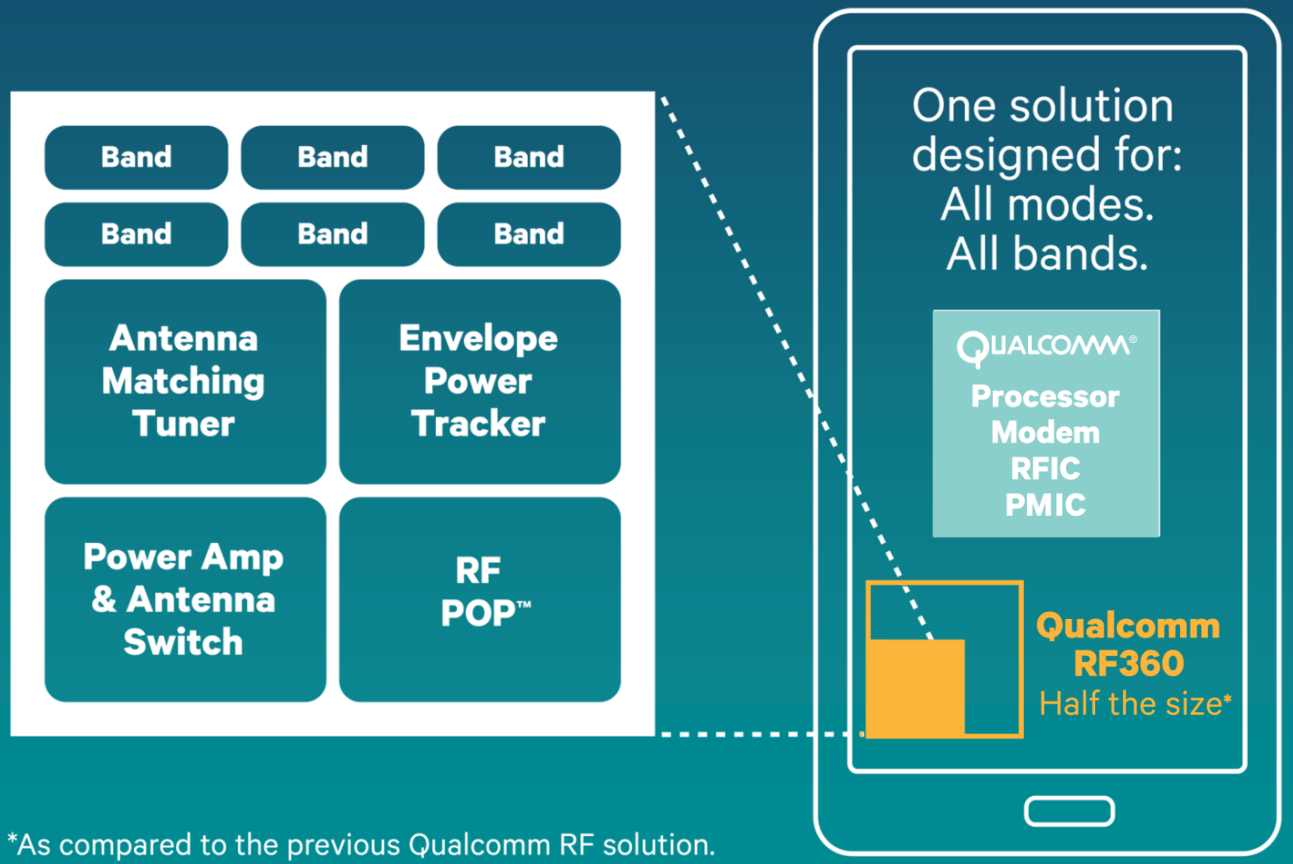
Single SKU

Power

Performance

Size

Time to market

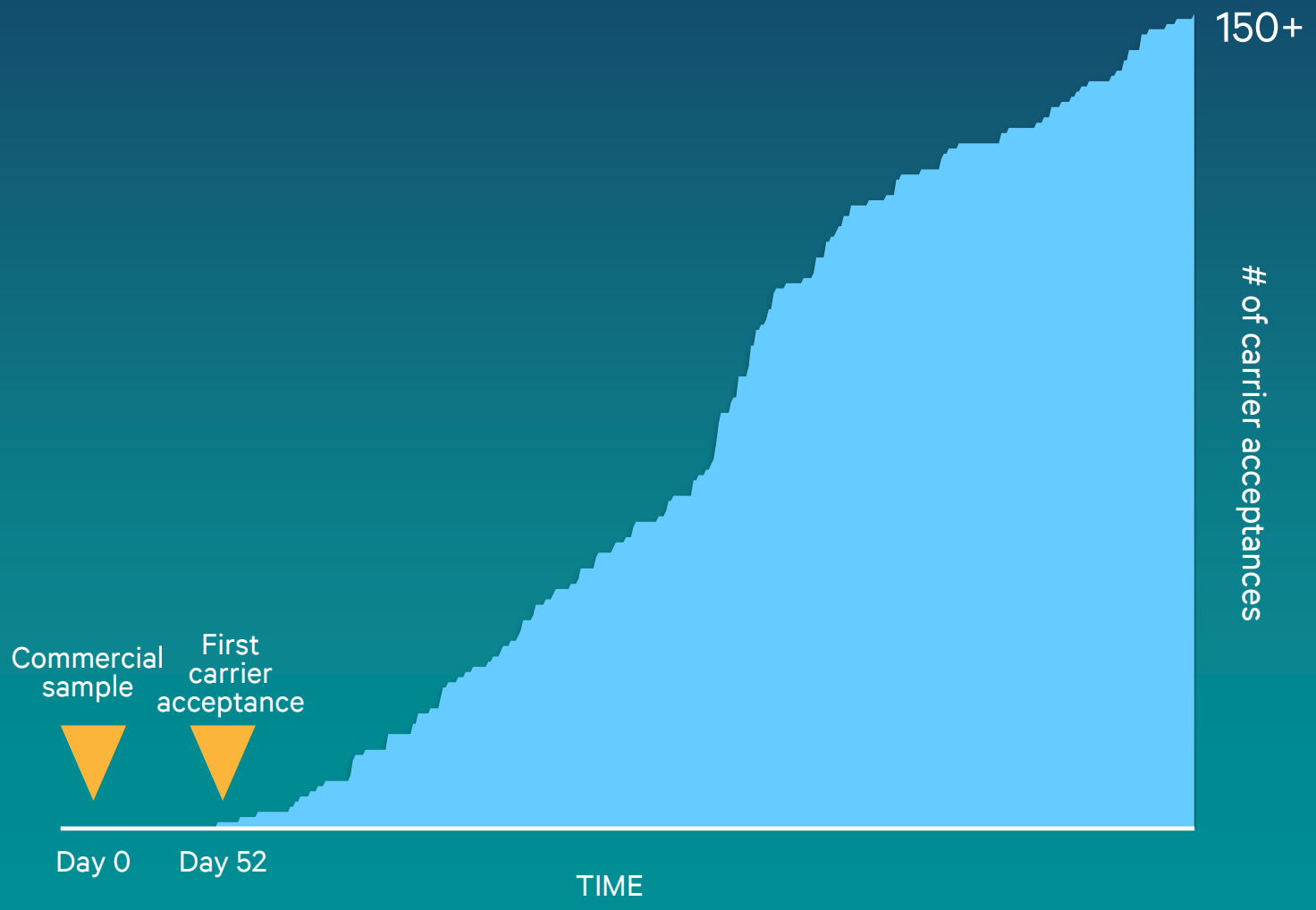


*As compared to the previous Qualcomm RF solution.

Unmatched scale of global deployment

Qualcomm® Snapdragon™ S4 MSM8x60 launch

- Commercial sample to first carrier acceptance in 52 days
- 30 OEMs, 30+ operators
- 150+ launches worldwide
- Our fastest integrated chip to ship 10M units



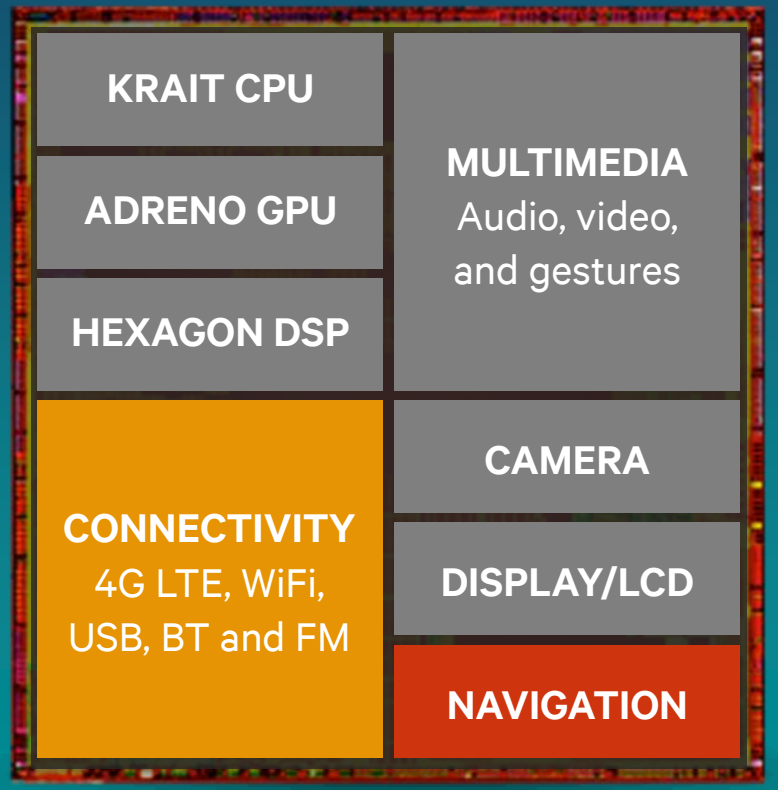
Qualcomm Snapdragon is a product of Qualcomm Technologies Inc.

Connectivity

Leadership in Wi-Fi and location technology

Integrated Qualcomm VIVE™ 802.11ac / 11n

Qualcomm IZat™ location



Qualcomm VIVE and Qualcomm IZat are products of Qualcomm Atheros Inc.

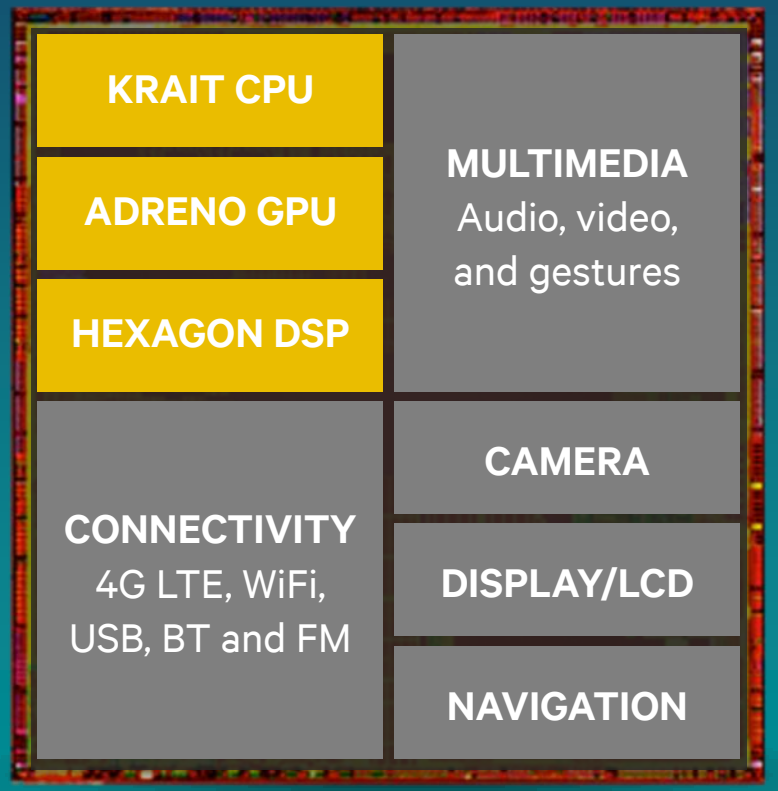
Navigation performance video

Applications SoC

Ahead of standard, off-the-shelf solutions

Custom design from the ground up

Integrated architecture (CPU, GPU, DSP)



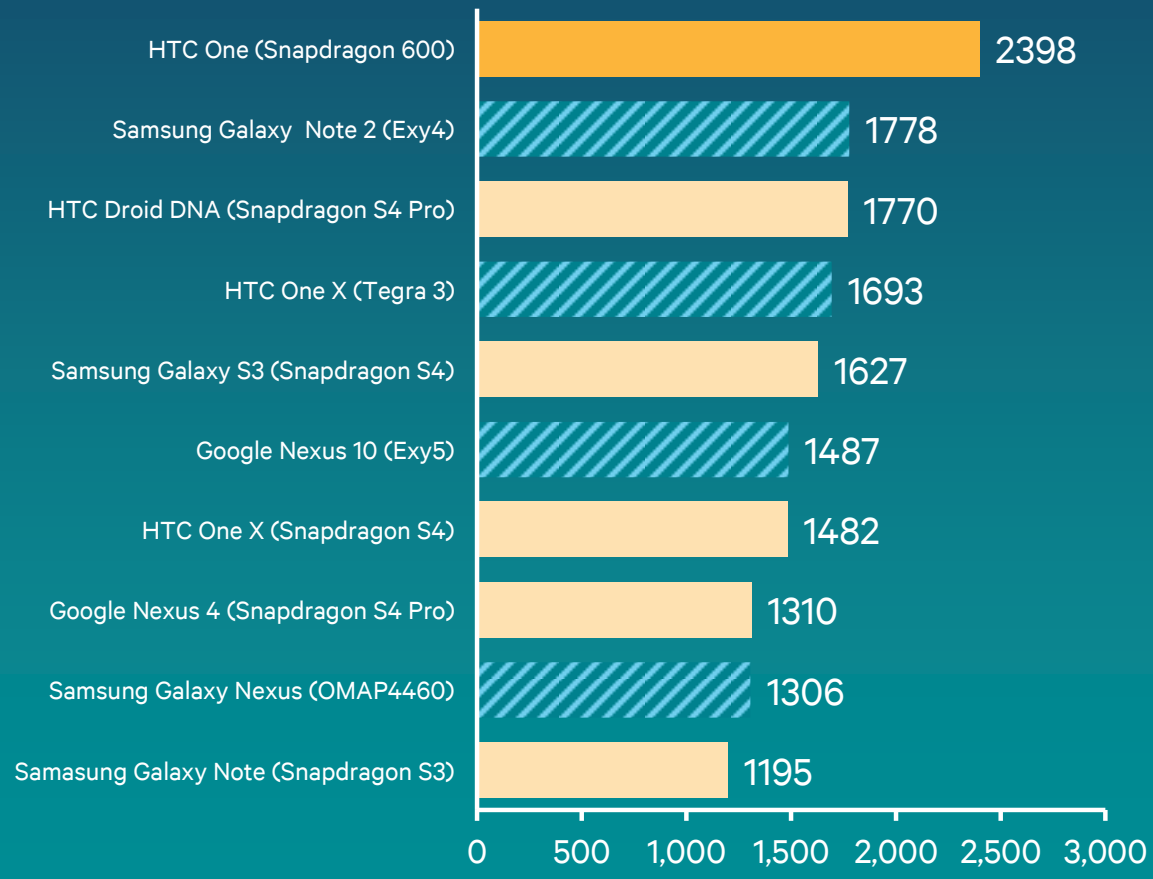
CPU performance

"Our two Vellamo benchmarks both show the One doing very well. In the HTML5 test, the One puts everything else to shame—including the old APQ8064 based Droid DNA and the Galaxy Note 2. The Qualcomm comparison is the more interesting as it echoes some of what we saw in the microbenchmarks—take into account the clock speed difference and you're looking at a 22% improvement in performance due to the new Krait 300 cores."

Brian Klug, AnandTech.com (4/12/13)

Vellamo benchmark – 2.0

HTML5 test overall score – (higher is better)



Source : AnandTech.com by Brian Klug 4/12/13, http://www.anandtech.com/show/6747/htc-one-review/
Vellamo is a product of Qualcomm Innovation Center Inc.

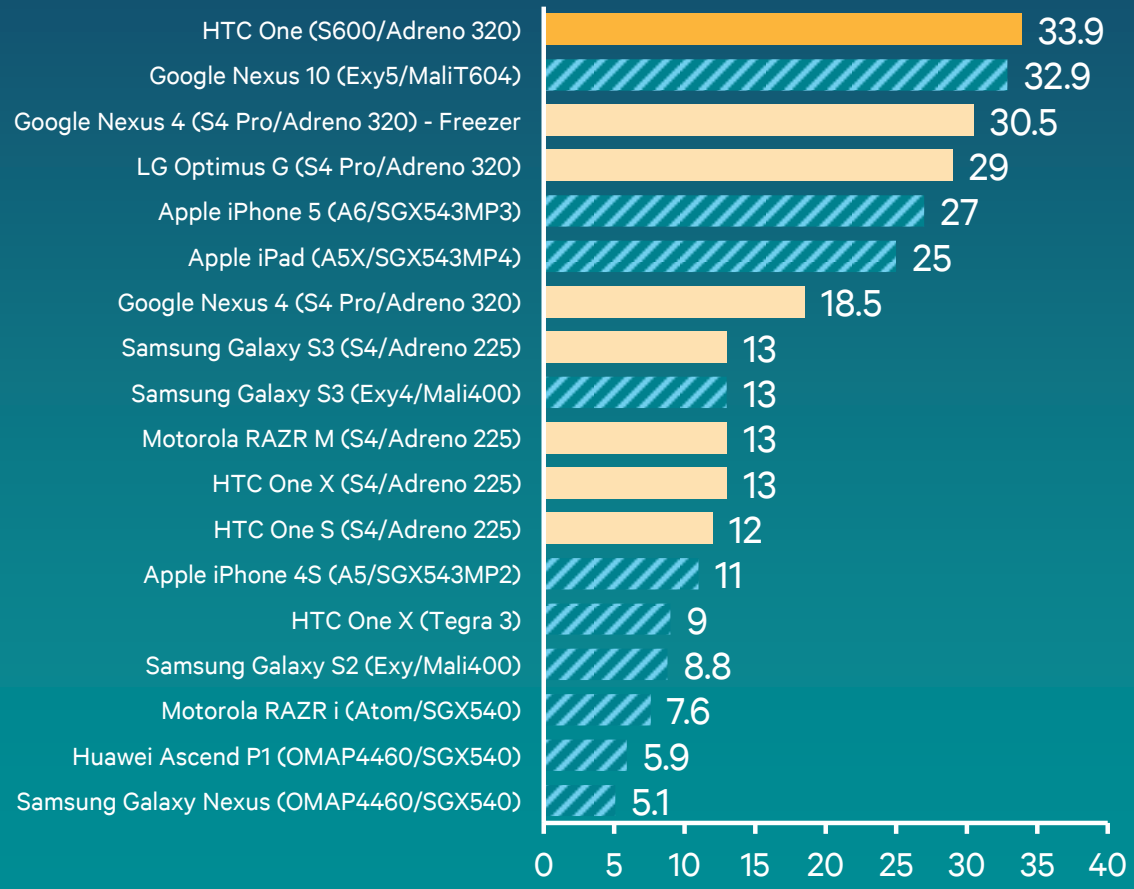
GPU performance

"The 'game' benchmarks in GLBench give us a good indication of overall performance. The off-screen results are most interesting from drawing comparative conclusions: The One is fast—it's now the fastest smartphone we've ever tested in the Egypt HD off-screen test."

Brian Klug, AnandTech.com (4/12/13)

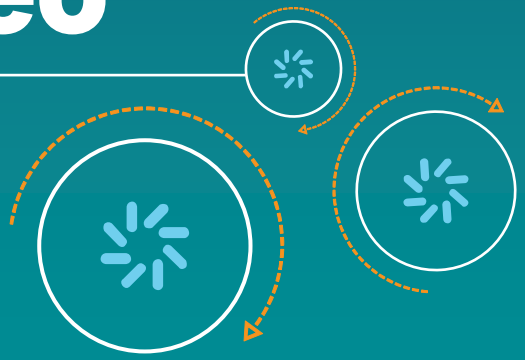
GLBenchmark 2.5 – Egypt HD (offscreen 1080p)

Frames per second – (higher is better)



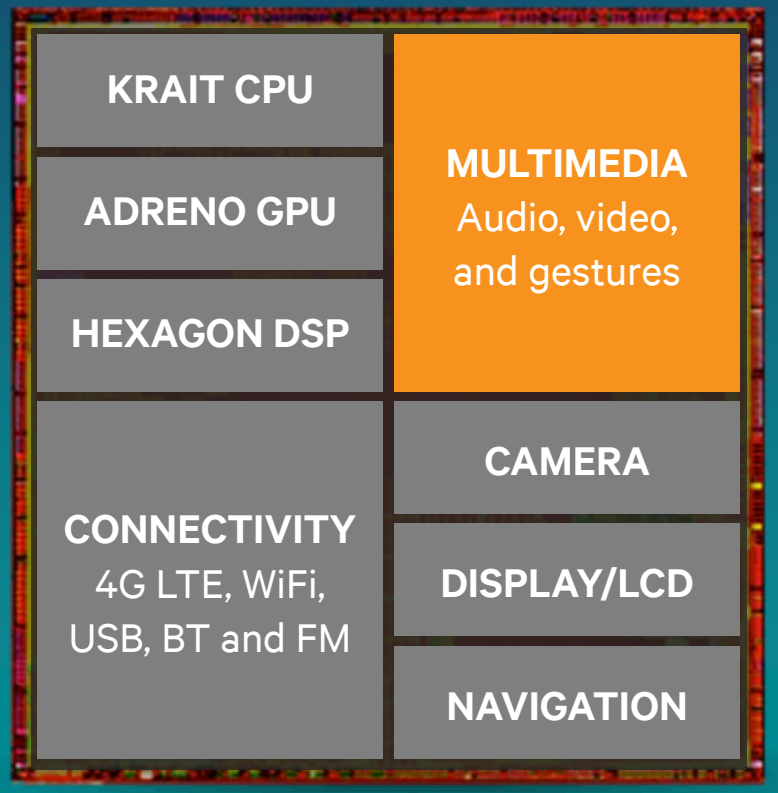
Source : AnandTech.com by Brian Klug 4/12/13, http://www.anandtech.com/show/6747/htc-one-review/

Browser performance video



Multimedia

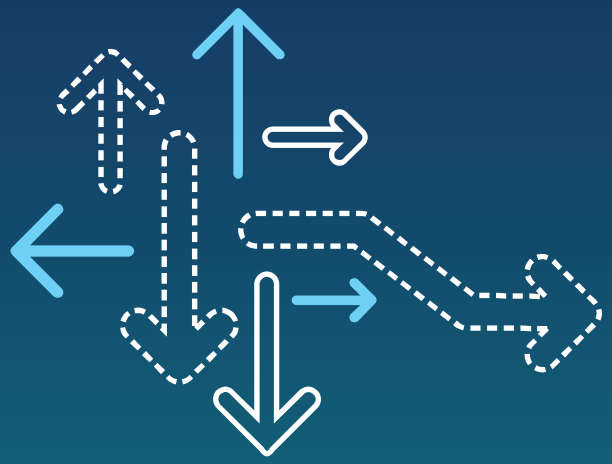
Setting consumer expectations



- Ultra HD capture & playback*
- 7.1 surround sound*
- Advanced camera features

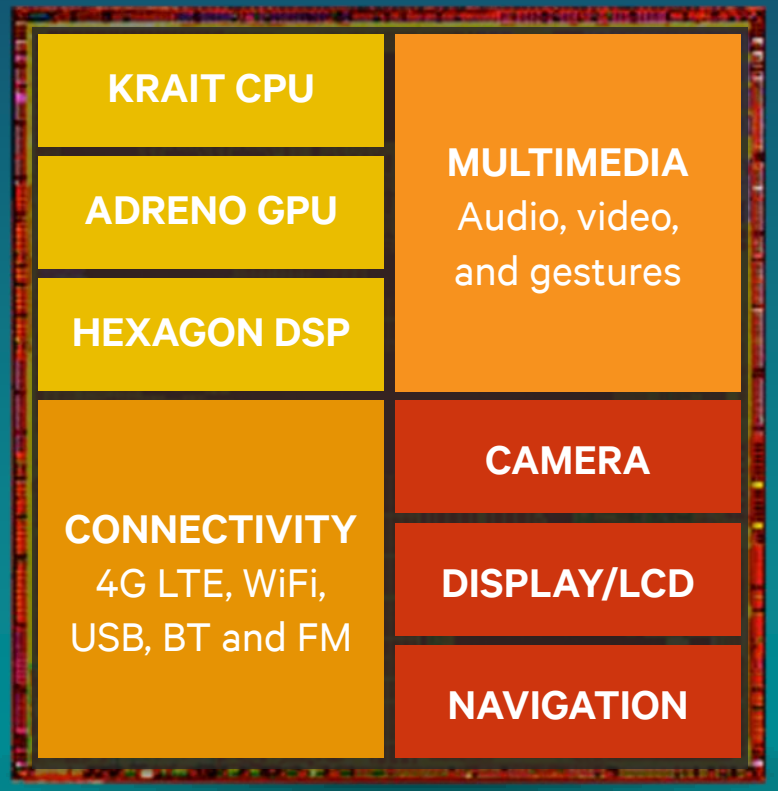
*Qualcomm Snapdragon 800 Processors.

Demos: Ultra HD and 7.1 sound



Power efficiency and integration

Critical in mobile and in our philosophy



Mobile requires to master and integrate all key technologies

Applications SoC

Multimedia

3G/4G LTE and connectivity

Power efficiency and integration

Qualcomm® Snapdragon™ processors

Snapdragon 800

Premium smartphones, Smart TVs, digital media adapters and tablets.

Snapdragon 600

Mid-high tier smartphones and tablets.

Snapdragon 400

High volume smartphones and tablets.

Snapdragon 200

Entry level smartphones.

At the heart of devices you love

At the heart of the devices you love

Qualcomm snapdragon

85+

Device customers

850+

Devices announced*

*Includes Qualcomm reference design
Source: Qualcomm Technologies Inc. data

Qualcomm Reference Design

Accelerating global growth of smartphones

Qualcomm Reference Design
snapdragon

200+
Devices launched

40+
OEMs

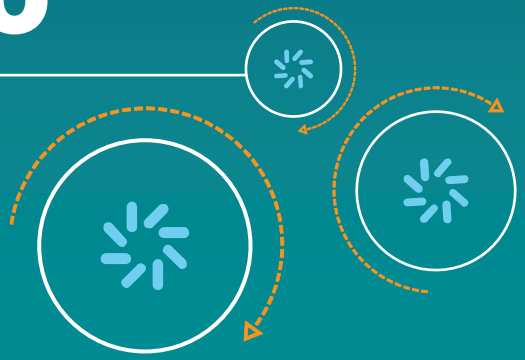
14
Countries

Qualcomm Reference Design is a product of Qualcomm Technologies Inc.
Source: Qualcomm Technologies Inc. data

Qualcomm Snapdragon across a range of devices

Smartphone technology is expanding into many other computing and CE categories

A Dragon is Coming video



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