Connecting the Next 25 Billion Things

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Qualcomm Technologies, Inc.
The Internet of Things (IoT) is here

25B
permanently connected
tings by 2020*

Body
- Smart glasses
- Smart watches
- Smart trackers
- Body sensors
- Voice and music

Home
- Smart router
- Home automation
- Energy management
- White appliances
- LED lighting
- Media devices

Cities
- Energy and metering
- Infrastructure
- Industrial/Building
- Transportation

Source: * Machina Research, Apr ’13, IDC Mar ’13, Gartner Sep ’13
Adjacent opportunities transformed by mobile

**Auto**
- Mobile experiences on car displays
- Vehicle-2-Cloud connectivity

**IoT**
- Connectivity everywhere and smart processing
- Mobile ecosystem scale
- Smartphone as IoT remote control

**Mobile compute**
- Smartphone changing productivity
- Cloud experience driving always on connectivity
- All-day computing

**Networking**
- Integrated gateway hub for the home or enterprise
- Wireless video defining use cases
- LTE and Wi-Fi convergence
The power of our mobile channel
Proven over time

Continued growth
Expansion into new technology

BASEBAND
CDMA
DSP
Transceiver
GPS
PMIC

WCDMA
Multimode
CPU
Camera
Audio/Music
Memory

LTE
Wi-Fi
Bluetooth
Sensor hub
Graphics
Video
Security

60GHz
Envelope tracker
Antenna tuner
PA/Switch
Filters
RF modules
Codec
Charging
Fingerprint
Touch
Bringing together the technologies for IoT success

Connectivity
- Bluetooth Smart
- Bluetooth Mesh
- 802.11ac
- 802.11ad
- 802.11n
- DSRC
- NFC
- 3G
- 4G/LTE
- Powerline
- GNSS/Location

Computing
- Cognitive computing
- Camera processing
- Audio processing
- Sensor core
- Security
- CPU
- GPU
- DSP
- Media processing
- Augmented reality
- Display processing
- Power management

Option 2
SAM opportunity by 2020

- ~$3B Automotive
- ~$5B Networking
- ~$15B IoT
- ~$6B Mobile compute

Adjacent opportunities
18% CAGR

2015: $12B
2020: $29B

$29B

~$1.7B of revenue in FY2015
IoT

- Smart cities and industrial: $1B
- Home control and automation: $4.6B
- Cameras and drones: $2.9B
- Wearables: $1.5B
- Voice and music: $1.7B
- Home entertainment: $3.1B

Estimated 2020 SAM
IoT business channels

Wearables, voice and music
Smart glasses, smart watches, smart bands, headsets (mono/stereo), speakers, soundbars

Consumer electronics
Home entertainment, home control and automation, cameras and drones, document imaging, mass market

Smart cities
Energy and metering, building security, infrastructure, industrial automation, retail, asset tracking, medical

Smart networks connecting everybody to everything...everywhere
Design momentum and traction

Controllers, storage and cameras
Audio
Smart TV/ DMA/Media
Appliances
Lighting
Home automation

LG
ASUS
chargepoint
SAMSUNG
SONY
Panasonic
sling
POWERTECH
HUAWEI
Hisense
LIBERTY
technicolor
LIFX
GREE
amazon
XBOXONE
RAZER
ZTE
TP-LINK
NETGEAR
Midea
amped wireless
SONOS
GoPro
SanDisk
INNOPIA
Microsoft
Whistle
D-Link
LINKSYS
orange
ecobee
Roche
PS4
IPS
Qolsys
MONSTER
Itron
Haier
Moving from discrete to integrated platforms

**Commercial drone**

- 5.8GHz RF PCB
- Main PCB
- Video Transmitter PCB
- GPS Receiver PCB
- Camera PCB
- Wi-Fi PCB
- Flight Controller PCB

7 circuit boards = 189 cm$^2$

**Qualcomm® Snapdragon Flight™ platform**

Hardware and software solution

1 Snapdragon Flight = 23.2 cm$^2$
## Drone product segments

<table>
<thead>
<tr>
<th></th>
<th>Toys</th>
<th>Mass market</th>
<th>Premium</th>
<th>Commercial</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fun</strong></td>
<td>Flying selfie, sports filming</td>
<td>Camera enthusiast, sports filming, small business</td>
<td>Agriculture, delivery, industrial</td>
<td></td>
</tr>
<tr>
<td><strong>Price</strong></td>
<td>&lt;$150</td>
<td>$150–$500</td>
<td>$500–$1500</td>
<td>$1500+</td>
</tr>
<tr>
<td><strong>Well established–trend to more computing</strong></td>
<td>Limited today, but to dominate with integrated solutions</td>
<td>Move to integrated solutions, lighter, autonomous, + features</td>
<td>Will grow steadily, but far from consumer volumes</td>
<td></td>
</tr>
<tr>
<td><strong>Video</strong></td>
<td>720p/1080p30 record</td>
<td>1080p/4k record</td>
<td>4k record</td>
<td>720p FPV</td>
</tr>
<tr>
<td><strong>Camera</strong></td>
<td>480p/720p FPV</td>
<td>1080p/4k record</td>
<td>4k record</td>
<td>720p FPV</td>
</tr>
<tr>
<td><strong>Quality</strong></td>
<td>Low quality camera</td>
<td>Mid quality camera/Sensor</td>
<td>High quality camera/Sensor</td>
<td></td>
</tr>
<tr>
<td><strong>Gimbal</strong></td>
<td>No Gimbal</td>
<td>eGimbal</td>
<td>Mechanical gimbal</td>
<td></td>
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<tr>
<td><strong>Range</strong></td>
<td>Indoor/Short range</td>
<td>Outdoor and indoor/Mid-range</td>
<td>Outdoor/Long-range</td>
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</tbody>
</table>
Qualcomm platforms to speed IoT development

25+ consumer electronics platforms

Snapdragon Smart Home Assistant

Smart Audio Module

Snapdragon Flight

Snapdragon IP Camera Platform

Snapdragon Wear

Dragonboard 410c
Wearables, voice and music

Option 1

- AllPlay
- Smart speakers
- Soundbars
- Bluetooth speakers
- Bluetooth headsets
- Bluetooth audio
- Smartwatch
- Wearables
Audio platform approach

Added value for our customers:

<table>
<thead>
<tr>
<th>Feature</th>
<th>Benefits</th>
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<tbody>
<tr>
<td><strong>Single silicon source</strong></td>
<td>Complimentary technologies</td>
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<tr>
<td></td>
<td>Simplified BOM</td>
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<td>Reduced supplier base</td>
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<tr>
<td><strong>Ready-to-use designs</strong></td>
<td>Reduced development time</td>
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<td></td>
<td>Reduced development cost</td>
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<tr>
<td></td>
<td>Reduced risk</td>
</tr>
<tr>
<td><strong>Advanced and unique</strong></td>
<td>Designed to enable superior performance</td>
</tr>
<tr>
<td>technologies</td>
<td>Designed to enable differentiating features</td>
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<tr>
<td></td>
<td>Unique features promote sales of end products</td>
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</tbody>
</table>
A vision for wearables

Multiple wearables per person, all connected with each other

- Wristbands/Medical bands
- Glasses
- Watch/Accessorize for access
- Headsets
- High-tech fabric/Wardrobe change on-the-go
Accelerating wearables
Range of ODMs and platform vendors

**Thinner, lighter, sleeker**
- Highly integrated chipsets
- ePoP package

**Ultra-long battery life**
- Low power chipsets
- Platform optimizations
- Wireless charging

**Always on, always sensing**
- Low power sensor hub
- End-to-end sensor optimizations

**Always connected**
- LTE and 3G
- Wi-Fi
- Bluetooth, BLE
- GNSS
Snapdragon enhancing video and gaming for TV

Exciting new screen experiences

Technologies inside Snapdragon

- Memory
- Security
- CPU
- Software
- Low power consumption
- Connectivity
- Bluetooth
- Audio
- Wi-Fi
- Graphics
- Games/Apps
- Bcast
- Video

Technologies that Snapdragon enables

- OTT box / DMA
- Gaming box
- TV “Side-Car”
- STB w/ broadcast
- Projector
- HMD
Wireless experience based on Snapdragon

4 products based on Snapdragon

**Wireless dongle**
HDMI dongle for 4K streaming

**Wireless monitor**
Built in dock in the monitor wireless monitor

**Wireless dock**
To replace the laptop with a tablet or a mobile

**Wireless projector**
Enhance the conference room experience
Virtual and augmented reality

VR untethered headset
- Mobile based VR
- Standalone VR

VR tethered headset
- PC, mobile or game console controlled VR

AR headset
- Standalone AR

*2020 Shipments (various industry analyst reports)
Smart assistant/speaker/home control hub

- Voice control
- Cloud-connected personal assistant
- Music streaming from cloud and BT devices
- Display: cover art; UI for apps e.g. Spotify; alerts/reminders; weather; etc.
- Camera with video analytics
Connectivity driving commercial/industrial IoT

**Connected commercial/Industrial**
HVAC, POS, remote sensing, industrial handheld

**Connected cities**
Lighting, parking, water mgmt., smart grid, metering

**Connected buildings**
Security and automation

**Connected transportation**
Fleet management, object/asset tracking

**QC connectivity solutions**
Powered by global standards with seamless interoperability across multiple vendors

**Connected health**
Gateways, devices, drug delivery/compliance
Thank you

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