Successful Entrepreneurship for Microsystems

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History

Some Market Opportunities

…and some food for thought!
A Qualcomm View....

Continued smartphone momentum

~20% CAGR for smartphone unit shipments expected between 2012-2017

~7B

Cumulative smartphone unit shipments forecast between 2013-2017

Ref: Qualcomm Analyst Day, November 20, 2013
Emerging region growth

~3.4B 3G/4G connections expected by 2017

>80%

Of handset shipments expected to be smartphones in 2017

Source: GSMA Intelligence, Nov '13; Gartner, Sep '13. This data now includes Eastern Europe in emerging regions, which was previously included in developed regions.

Ref: Qualcomm Analyst Day, November 20, 2013
Applying mobile technologies to everything

Making them more aware, connected, intelligent and interactive
The 1000x Data Challenge

Data Demand Increase

Richer Content  Global Traffic  More Devices

Ref: Qualcomm Stockholder Meeting, March 4, 2014
Expanding Application Areas

Smartphone experience influencing tablet designs
~30% CAGR forecast of tablet shipments from 2012-2017

Common HW/SW

Long battery life

Touch screen

Embedded sensors

Advanced camera capabilities

Common app development

Source: Gartner, Sep '13

Ref: Qualcomm Stockholder Meeting, March 4, 2014
Snapdragon automotive solutions for connected infotainment
Driving the next generation of in-car connected experiences

Ref: Qualcomm Stockholder Meeting, March 4, 2014
The Internet of Things (IoT)

Connected smarthome
Transforming the home experience

- Game consoles
- Smartphones
- Tablets
- TVs

Connectivity (802.11ac and low power Wi-Fi)

Home gateway

- Security
- Appliances
- Temperature
- Lighting

Internet processor

Small cells

Ref: Qualcomm Stockholder Meeting, March 4, 2014
Qualcomm® AllPlay™ smart media platform is built on top of AllJoyn™

Stream from multiple sources to multiple syncs

Stream music directly from the cloud

Stream music from phones/tablets

Ref: Qualcomm Stockholder Meeting, March 4, 2014
The Skyworks View...

Connected Home Applications

- Smart Door Locks
- Notebook PC
- Printer
- Home Stereo
- Smart Appliance
- 802.11ac Access Point
- Home Security
- Set-top Box
- Blu-ray Player
- Gaming Console
- Media Gateway
- Monitoring
- Smart Meter
- HDTV
- Smart Home Controller
- Wireless Door and Window Sensors
- Smart Thermostat and Smoke/CO₂ Alarm
- Smart Lighting

Ref: Skyworks, Investor Presentation 2014

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Digital 6th Sense…
Augmentation of human ability

- NOW the LOCATION
- SENSE the user’s MOTION
- SEE the user’s ENVIRONMENT
- HEAR the user’s SURROUNDINGS

Ref: Qualcomm Analyst Day, November 20, 2013
Good news for Start-ups!

Targeted M&A

Acquisitions over the past 5 years*

<table>
<thead>
<tr>
<th>Range</th>
<th>Count</th>
<th>Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;$350M</td>
<td>1</td>
<td>Technology focused</td>
</tr>
<tr>
<td>$50M-$350M</td>
<td>10</td>
<td>Extension of R&amp;D program</td>
</tr>
<tr>
<td>&lt;$50M</td>
<td>38</td>
<td>Accelerate position in new growth areas</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Atheros only &gt;$350 million in last five fiscal years</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&gt;75% of deals less than $50M</td>
</tr>
</tbody>
</table>

Ref: Qualcomm Analyst Day, November 20, 2013
Market Drivers
Industry Directions & Challenges
History
Smartphones drive diverse technologies

- Low Cost
- Battery Life
- Compact
- Performance
- More Moore
- More than Moore
- Ultra-thin devices
- More than Moore
- More than Moore
- MEMS
- Sensors
- TSV + FC stack
- Architecture, SW, Design, …
More Moore

...Transistor complexities have doubled every 2 years

Transistors per Chip, M
Minimum Feature Size, um

Moore’s Law
2x / 12mos...1965-70
2x / 18mos,,1970-90’s
2x / 24mos...now

Source: IC Knowledge, ISSCC, TCX

Fabless Co.’s
Semiconductor Co’s – Fairchild, T.I., Motorola, National, Intel, Toshiba, …
System Co.’s – IBM, Hitachi, Sony, Philips, Unisys,…
ECONOMIC challenges are threatening

Increased Cost of Capital, R&D, Design

Costs associated with node progression have been rising significantly

<table>
<thead>
<tr>
<th>Node Progression</th>
<th>Fab cost $ Millions</th>
<th>Process development cost $ Millions</th>
<th>Chip design cost including fabless overhead costs $ Millions</th>
</tr>
</thead>
<tbody>
<tr>
<td>130nm</td>
<td>1,450</td>
<td>250</td>
<td>15</td>
</tr>
<tr>
<td>90nm</td>
<td>1,800</td>
<td>310</td>
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<tr>
<td>65nm</td>
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<tr>
<td>45nm</td>
<td>4,000</td>
<td>600</td>
<td>60</td>
</tr>
<tr>
<td>32nm</td>
<td>4,850</td>
<td>900</td>
<td>100</td>
</tr>
<tr>
<td>22nm</td>
<td>6,700</td>
<td>1,300</td>
<td>150</td>
</tr>
</tbody>
</table>

* Chip design cost includes product R&D cost (design, verification & photomask) and other fabless costs (overhead, IP licensing, etc.).

Source: Press Reports; iSuppli; ICKnowledge; GSA; WorldFabWatch; ITRS

Estimated cost CAGR

- 16%
- 18%
- 17%
- 21%
- 25%
- 25%

+36% p.a.
+39% p.a.
+58% p.a.

~30%
~40%
~60%
Entrepreneurial Opportunities
Product Development Life Cycle
Running Lean Intro
So, if you had an idea, what should you do?
...entrepreneurship creation

- Internal Development at an IDM
- Software or Board level product
- License IP
- Fabless I.C. company
- Existing Standard, Technology Market Customer Base
- New

..but, only a very small fraction of fabless start-ups are successful!!

~1300 fabless IC companies worldwide
Create product that solves a real Customer Problem…
A “must-have” for the customer
…a Differentiated solution

- No customer engagement until it’s too late
- Not understanding and meeting customer expectations
- Overly aggressive product specifications
- The “kitchen-sink syndrome”
- Poor management of the Supply Chain

A systematic approach to planning and execution
Typical ASIC Development Cycle

Start Design

ASIC DESIGN

Proto

Prod Ramp

Hi Volume

Year 0

Year 1

Year 2

Software

α

Software

β

Software

Prod.

Initial Silicon

Initial Silicon Ramp

Initial Product Ramp

Volume Production

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The New Focus

Vetting Product Ideas

Hashtag: #leanstartup

ASH MAURYA
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http://www.ashmaurya.com

Ref: https://www.youtube.com/watch?v=EOhzUMseaHs
The New Focus

SHOULD it be Built?

CAN it be Built?
Please review the following video:
https://www.youtube.com/watch?v=EOhzUMseaHs

What are the top 3 learnings from Ash Maurya’s Introductory video? Why do you consider these important

…a 1-page summary.