Arm Limited
Q1 2018 Roadshow Slides

Arm Limited is a subsidiary of SoftBank
Technology trends that will redefine all industries

- Artificial Intelligence in every device
- Autonomous machines
- Augmented reality
- Hyperscale cloud and connectivity

Security and Privacy
Arm defines the technology that will redefine all industries

<table>
<thead>
<tr>
<th></th>
<th>Mobile and Consumer</th>
<th>Networking and Servers</th>
<th>Automotive and Robotics</th>
<th>Internet of Things</th>
</tr>
</thead>
<tbody>
<tr>
<td>Artificial Intelligence in every device</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
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<tr>
<td>Autonomous machines</td>
<td>✔️</td>
<td></td>
<td>✔️</td>
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<tr>
<td>Augmented reality</td>
<td>✔️</td>
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<tr>
<td>Hyperscale cloud and connectivity</td>
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<td>✔️</td>
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<tr>
<td>Security and Privacy</td>
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<td>✔️</td>
<td>✔️</td>
</tr>
</tbody>
</table>
Arm introduction

Global leader in technology licensing
• R&D outsourcing for semiconductor companies

Innovative business model
• Upfront licence fee – flexible licensing models
• Ongoing royalties on partner sales
• Technology reused across multiple applications

Long-term, secular growth markets

>1,590 licences
Growing by >100 every year
>510 potential royalty payers

>21 bn Arm-based chips shipped in 2017
~15% CAGR over previous 5 years
Arm’s business model

Arm develops technology that is licensed to semiconductor companies

Arm receives an upfront license fee and a royalty on every chip that contains its technology
Arm’s strategy

Maintain or gain share in long-term growth markets

• From mobile phones to networking infrastructure and servers to embedded smart devices and automotive

Increase value of Arm technology per smart device

• Invest in developing more advanced processors with higher royalty rates
• Physical IP and multimedia IP further increase Arm’s value per chip

Explore and exploit new opportunities in emerging applications created by the Internet of Things

Invest to create a sustainable business, fit for the long term

• Create superior returns by developing new technology that will deliver increased profits and cash generation in the future
Arm’s main growth markets

Mobile and Consumer Devices
- Smartphones, tablets and laptops
- Apps processor, modem, connectivity, touchscreen and image sensors
- Growth coming from higher-value Arm technology such as Arm v8-A, octa core, multimedia

$77bn
TAM 2026

Networking & Servers
- Base stations, routers, switches, and servers for cloud and data centres
- Networks evolve to cope with increased data at lower latency: virtualisation, integration and programmability
- Most major chip vendors have announced Arm-based products

$41bn
TAM 2026

Embedded Markets
- Automotive, white-goods, wearables, smart devices in industrial and utilities
- Microcontrollers, smartcards, embedded connectivity chips
- 300 companies have licenced Arm processors for use in embedded computing devices

$85bn
TAM 2026
History of Arm

Joint venture between Acorn Computers and Apple

1990

Designed into first mobile phones and then smartphones

1993 onwards

Now all electronic devices can use smart Arm technology

Today
Smart devices contain many Arm processors

**Applications Processor** chips can contain multiple Arm technologies
- Arm v8-A processor for OS and apps
- Cortex-R controller for modem
- Cortex-M controllers for peripherals
- Arm Mali multimedia processors: GPU, video, display, camera, etc.
- Arm physical IP

When new functions are added to smartphones it creates opportunity for new Arm IP
Arm-based chip shipments

125bn

Arm-based chips shipped to date

39%

Market share in 2017

Arm-powered SoCs shipped (billions)

0 5 10 15 20

1991 2017

Calendar Years

17.7bn 21.3bn
Arm's opportunity continues to broaden

Semiconductor industry continues to grow: 8% by volume, 3% by value over past five years

Proportion of chips with processors is increasing over the medium term: 65% in 2017

Arm is gaining share within the “chips with processors” segment of the industry: 39% in 2017

* Data source: WSTS, April 2018 and Arm, Industry volume excluding analog and memory
** Arm estimates
From revenue to profits

**FY 2017 Revenues**

<table>
<thead>
<tr>
<th>Category</th>
<th>$m</th>
<th>£m</th>
<th>%revs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Licensing</td>
<td>618</td>
<td>455</td>
<td>33%</td>
</tr>
<tr>
<td>Royalty</td>
<td>1,087</td>
<td>819</td>
<td>60%</td>
</tr>
<tr>
<td>Software and Services</td>
<td>126</td>
<td>94</td>
<td>7%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1,831</td>
<td>1,368</td>
<td>100%</td>
</tr>
</tbody>
</table>

**Costs (£m)**

1,043

**Adjusted EBITDA (£m)**

325

**Operating Margin**

24%

**Other expenses (£m)**

180

**IFRS EBIT (£m)**

145

- Over 95% of revenues earned in US dollars
- Royalties are a growing proportion of revenues
- Cost increase as Arm accelerates investment in R&D for future product developments
- 10% move in $/£ impacts profits by ~15% (forex impacts £ revenues and costs)
- Operating margins will be lower than in recent periods as investments grow faster than revenues
- Excludes amortisation of intangibles related to the acquisition of Arm by SoftBank

*Financial numbers aligned with SoftBank reporting periods (01 April 2017 to 31 March 2018)*
### Qtr. ending June 2018 – Financial summary

<table>
<thead>
<tr>
<th></th>
<th>Q1 2017</th>
<th>Q1 2018</th>
<th>Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Revenues ($m)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Licensing</td>
<td>149</td>
<td>85</td>
<td>-43%</td>
</tr>
<tr>
<td>Royalty</td>
<td>250</td>
<td>261</td>
<td>4%</td>
</tr>
<tr>
<td>Software and Services</td>
<td>29</td>
<td>35</td>
<td>21%</td>
</tr>
<tr>
<td><strong>Total ($m)</strong></td>
<td>428</td>
<td>381</td>
<td>-11%</td>
</tr>
<tr>
<td><strong>Revenues (£m)</strong></td>
<td>329</td>
<td>281</td>
<td>-15%</td>
</tr>
<tr>
<td>COGS (£m)</td>
<td>18</td>
<td>24</td>
<td>33%</td>
</tr>
<tr>
<td>R&amp;D (£m)</td>
<td>134</td>
<td>145</td>
<td>8%</td>
</tr>
<tr>
<td>SG&amp;A (£m)</td>
<td>95</td>
<td>111</td>
<td>17%</td>
</tr>
<tr>
<td>Costs (£m)</td>
<td>247</td>
<td>280</td>
<td>13%</td>
</tr>
<tr>
<td><strong>Adjusted EBITDA (£m)</strong></td>
<td>82</td>
<td>1</td>
<td>-99%</td>
</tr>
<tr>
<td>Depreciation &amp; amortisation</td>
<td>14</td>
<td>18</td>
<td>29%</td>
</tr>
<tr>
<td>Other operating expenses (£m)</td>
<td>25</td>
<td>-1,090</td>
<td></td>
</tr>
<tr>
<td><strong>IFRS EBIT (£m)</strong></td>
<td>43</td>
<td>1,073</td>
<td></td>
</tr>
</tbody>
</table>

Licensing can fluctuate quarter to quarter. In Q1, lower revenues are primarily due to contract delays as Arm China was established.

Royalty revenue growth driven by market share gains and increasing royalty per chip.

USD weakened versus sterling in past year (1.30 vs 1.36)

10% increase in total headcount at end of Qtr 17% if Arm China is included

Revaluation of Arm China at $1.5bn
Q1 Licensing: 16 is below the normal range

Number of licenses signed in Q1 2018 is lower due to Arm China needing to novate contracts from Arm Limited to Arm China.

This has resulted in a delay to licenses being closed and we have not seen a reduction in demand for Arm technology.
Licensing enables future royalties

Arm signed 16 licences Q1 2018

Arm’s current royalty revenues are derived from licences signed many years ago

Growing base yields royalty revenues over long period

Significant Royalty Potential from Recent Licences

~575 licences signed since Q1 2014

~500 licences

~35% of Arm’s most recent licences are drivers of future royalty revenue

Cumulative Licences

Pre-2013 2014 2015 2016 2017 2018

Financial Years

0 500 1000 1500

>1590

~35% of Arm’s most recent licences are drivers of future royalty revenue

~500 licences

~500 licences

~500 licences
### Arm’s expanding opportunity

<table>
<thead>
<tr>
<th>Category</th>
<th>2017 Market Share</th>
<th>2017 Market Value</th>
<th>2026 Market Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobile</td>
<td>90%</td>
<td>$21bn</td>
<td>$32bn</td>
</tr>
<tr>
<td></td>
<td>45%</td>
<td>$14bn</td>
<td>$18bn</td>
</tr>
<tr>
<td></td>
<td>~1%</td>
<td>$17bn</td>
<td>$22bn</td>
</tr>
<tr>
<td></td>
<td>10%</td>
<td>$8bn</td>
<td>$15bn</td>
</tr>
<tr>
<td>Infrastructure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Networking</td>
<td>20%</td>
<td>$14bn</td>
<td>$19bn</td>
</tr>
<tr>
<td>Servers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Automotive</td>
<td>50%</td>
<td>$4bn</td>
<td>$15bn</td>
</tr>
<tr>
<td>Other automotive</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other mobile chips</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Arm’s expanding opportunity

<table>
<thead>
<tr>
<th></th>
<th>2017</th>
<th>2026</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Embedded</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Microcontrollers/ SIM Cards</td>
<td>20% $17bn</td>
<td>40% $21bn</td>
</tr>
<tr>
<td>Controller in IoT Devices</td>
<td>90% $7bn</td>
<td>90% $24bn</td>
</tr>
<tr>
<td><strong>Other Markets</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consumer Electronics</td>
<td>40% $21bn</td>
<td>40% $27bn</td>
</tr>
<tr>
<td>Other chips</td>
<td>40% $7bn</td>
<td>40% $10bn</td>
</tr>
<tr>
<td><strong>Total Market</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All chips with processors (current TAM)</td>
<td>39% $130bn</td>
<td>39% $200bn</td>
</tr>
<tr>
<td>All addressable chips (future TAM)</td>
<td>25% $165bn</td>
<td>25% $220bn</td>
</tr>
</tbody>
</table>
Establishing Arm China JV in Fiscal Q1 2018
Building a bigger business; built on strong foundations

>150
Licensees

10bn
Chips shipped by Chinese partners using Arm processor technology

95%
Chinese designed SoC based on Arm processor technology

x140
Growth in volume shipment by Chinese partners 2006-2017

Arm China will be able to better access new local technology opportunities, especially in server, smart meter/grids and IoT
Establishing Arm China JV in Fiscal Q1 2018
Building a bigger business; built on strong foundations

Arm China JV establishment was initiated in early Q1 2018 and completed at the end Q1.

Novation (transfer) process or historical contracts resulted in a delay to contract signing in the current quarter.

In Q1 only four new contracts were added with Chinese companies.

>150
Customers to novate from Arm Limited to Arm China

341
Employees transferred to Arm China in Q1

~20%
Arm’s revenue came from China in 2017

10-20
Licenses signed in a typical quarter with Chinese customers
**Arm’s opportunity in mobile and consumer**

Continued growth from advanced technology and new form factors

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**Growth has been driven by advanced Arm technologies**

<table>
<thead>
<tr>
<th>Year</th>
<th>Arm v7-A</th>
<th>Arm v8-A</th>
<th>Mali graphics</th>
<th>High core count</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td></td>
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<td></td>
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<td>2015</td>
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<tr>
<td>2017</td>
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</table>

**Consumers pay a premium for performance and features**

$60 of Arm-addressable chips in the latest high-end smartphones

**Investment in smartphones has led to new form factors**

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Arm’s growth opportunity
Arm’s opportunity in automotive

Functional safety, consolidation, partitioning, performance, power, cost

**Vision ADAS**
Cortex-A55 + Cortex-R52 + Mali C71
Heterogeneous multi-core
Computer Vision Control

**Infotainment**
Cortex-A75 + Cortex-A55 + Mali G51
Energy-aware scheduling
Rich OS
Security

**Powertrain**
Cortex-R52
Real time
Homogeneous multi-core

**Autonomous driving**
Cortex-A75 + Mali G72 + Cortex-R52 + ML
High performance multi-cluster
Machine Learning
Functional safety

**Central body control**
Cortex-M7, Cortex-M0+
Low power
Efficient performance
Scalable

Other modules
- V2X
- Chassis
- Security
- Radar
- Sensor
- Audio
Arm’s opportunity in servers
Targeting 25% share (~1% share today)

Arm processors are suitable for >50% of data centre workloads

- Search and Indexing
- High-performance storage
- Machine learning and big data
- Web servers, database servers
- Email, PaaS services

Arm v8-A selected for High Performance Computing

- Barcelona Supercomputer Centre selects Arm v8-A for Mare Nostrum 4
- Fujitsu and RIKEN select Arm v8-A for the Post-K supercomputer

Now shipping into enterprise applications

Arm v8-A server chips are shipping in volume into storage appliances.

Fujitsu and RIKEN select Arm v8-A for the Post-K supercomputer.

Microsoft has ported the core components of Windows Server onto Arm

© Arm 2018
Arm’s opportunity in networking
Targeting >50% share of chips in next-generation networks

Future networks will be based on open source collaboration

Network Function Applications
- OpenStack
- OpenDaylight
- Linux
- Hypervisors
- Open vSwitch
- OpenDataPlane

Networking software is being optimised for Arm-based chips

OpenDataPlane project members

Accelerating data comms from server to server

“When you offload to hardware, you run roughly a tenth the latency, a tenth the power, a tenth the cost. Here’s some great news: we’re in the semiconductor business!”

James Hamilton, VP and Distinguished Engineer, AWS
Arm’s opportunity in IoT – silicon IP
The architecture of choice for IoT developers

Cortex-M processors enable secure, low-cost IoT devices

High-value tech is now available at consumer price points

Every thing will be connected

Annual production of IoT modules

Arm’s growth opportunity
Arm’s opportunity in IoT – software and services
Investing to create new revenue streams

Arm forecasts a $1 trillion TAM for IoT technology in 2035

Arm’s IoT platform is being integrated into OEM lifetime management services

Electronic components
Assembly
Distribution
Installation
IT services
Financial services
Telecoms services

The TAM refers to IoT technology (electronics, software, services) only, it excludes the value of the ‘things’ that contain the IoT modules
Artificial intelligence in every device
Learning in the cloud, inference at the edge

Mobile

Automotive

Robotics

Drones

IoT

Home, surveillance & analytics

VR/MR

Shipping & logistics
Machine learning and computer vision

The key workloads for intelligent computers

Widely-available software tools
give developers access to ML

- TensorFlow
- Caffe2
- Arm Compute Library
- OpenCV
- cuDNN

Optimise for performance, cost
and programmability

- More than 50x AI performance boost on the CPU in the next 3-5 years

The latest Arm v8-A CPUs implement new instructions for ML calculations, and increase the memory bandwidth between CPUs and accelerators.

Stable algorithms can be
hardwired into accelerators

- Arm's Project Trillium includes accelerators for Machine Learning and Object Detection and optimised libraries for Neural Networks. It is up to 80x more efficient than a typical DSP implementation.
Autonomous machines
Advanced compute is moving to the physical domain

Robots and autonomous cars will operate alongside people

The physical domain requires stringent safety standards

Vehicle electrification will force the pace of change

- All future models from Volvo will have electric or hybrid engines
- UK and France have announced plans to phase out petrol vehicles by 2040

Arm DynamIQ supports ASIL D for safety critical automotive and industrial systems
Augmented reality
New experiences and new user interfaces

Seamless interactions between humans, machines and data

Augmented reality (AR) overlays digital information onto the user’s view of their immediate surroundings.

AR relies on advanced display technologies and new techniques for reading user input, such as 3D sensors.

A demanding roadmap for mobile GPU performance

Latency: <16ms

to avoid motion sickness

Frame-rate: >60 Hz

for a smooth viewing experience

Resolution: 2K minimum

for realistic images

Driving innovation in displays, 3D sensors and computer vision

Source: Sony
Hyperscale cloud and connectivity
Infrastructure for the information revolution

Enterprise compute is moving to the cloud

Insatiable demand for data is driving new standards

Performance targets for 5G networks

- 1000x data volume per km2
- 1000x connections per km2
- 100x user data rate
- 80% reduction in latency
- 80% reduction in opex
- 90% reduction in energy

Workloads will be shared across devices, base stations and servers

Autonomous vehicles will be controlled by computers in the car, in neighbouring cars, in nearby base stations and in remote datacentres

Technology drivers
Information security
The fundamental component of all connected systems

Secure systems are built on a hardware root of trust

- trusted software
- trusted hardware
- true random number
- crypto cell
- secure memory
- secure peripherals

Devices must be kept secure with regular software updates

Good security is inexpensive to implement and costly to crack

Arm Mbed Cloud takes care of complex security tasks in large-scale IoT networks. This allows Arm’s OEM customers to concentrate their development on features that differentiate their product offering.

Chinese OEM to recall up to 10,000 webcams after hack
Mirai Botnet attack, October 2016
Arm's current business

Arm develops **intellectual property** (IP) blocks which are used in silicon chips.

Our partners combine Arm IP with their own IP to create complete chip designs.

We earn **license fees** when we deliver Arm IP to our partners and **royalties** when our partners ship chips that contain Arm IP.

Highly **profitable and cash generative**
### Accelerating investment to increase share gains

- **Mbed Cloud SaaS business**
- **Early-stage investment but many years in research**
- Securely connect and manage any device, using any communications technology, supporting any cloud platform
  - Device Management: secure device identification, on-boarding and configuring
  - Secure Connectivity: manage your IoT networking using standard-based comms
  - Data Management: Ingestion and aggregation of data

### Generating profits and cash to be reinvested

### Investing to create new revenue streams

- Mbed Cloud Partners

![Mbed Cloud Partners](image)
Revenues, investments and profits

Until 2016 revenues grew faster than costs as Arm constrained investment in R&D to enable increasing profits.

For the current phase of investment Arm expects costs to grow faster than revenues.

This should yield even greater profits in the future.
Investment philosophy

“Now is the time to be sowing, not harvesting”

- Rate of investment is discretionary and under Arm’s control
- SoftBank has asked Arm to accelerate investments and to increase risk appetite
- All costs are expected to be financed from IP business’ revenue streams
- During this accelerated investment phase, costs are expected to grow faster than revenues

Arm has over £1.4bn of net cash and no debt
Increase in Q1 2018 is due to sale of Arm’s stake in the Arm China Joint Venture
Return on Investments – Arm v8-A case study

Arm incurs R&D costs many years before revenue starts

Research into 64-bit computing started in 2000

Arm v8-A Development starts

Architecture development and processor design

First generation of processors

Multiple processors in development

Return on Investments – General case

Arm incurs R&D costs many years before revenue starts

Research into 64-bit computing started in 2000

New technology development starts

Initial development phase

New technology announced

Investment ramps

First technology agreements

Technology delivery

Recurring revenue starts

New technology development starts

Initial development phase

Revenue continues for many years after the investment phase, yielding high profits over time
Investing in people, infrastructure to create new products

Costs are higher in 2018 as Arm expands R&D capability

Cost increases are expected to be consistent with increases in headcount

<table>
<thead>
<tr>
<th>Q1 2017 Costs</th>
<th>10% increase in headcount*</th>
<th>£247m</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1 2018 Costs</td>
<td>Increased IT, facilities and other investments</td>
<td>£28m</td>
</tr>
<tr>
<td></td>
<td>Bad debt provision</td>
<td>£2m</td>
</tr>
<tr>
<td></td>
<td>Impact of stronger sterling</td>
<td>(£5m)</td>
</tr>
<tr>
<td></td>
<td>Total Costs</td>
<td>£280m</td>
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</tbody>
</table>

*17% including the 341 employees transferred to Arm China at the end of Q1
## Arm Investor Relations Contact

<table>
<thead>
<tr>
<th>Contact</th>
<th>Title</th>
<th>Contact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ian Thornton</td>
<td>Head of Investor Relations</td>
<td>+44 1223 400796</td>
</tr>
<tr>
<td></td>
<td></td>
<td><a href="mailto:ian.thornton@arm.com">ian.thornton@arm.com</a></td>
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</tbody>
</table>

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