ARM

Q4 2016 Roadshow Slides

ARM Holdings is a subsidiary of SoftBank

ARM Introduction

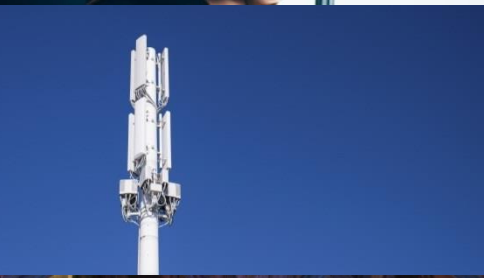
- Global leader in the development of licensable technology
  - R&D outsourcing for semiconductor companies
- Innovative business model yields high margins
  - Upfront licence fee – flexible licensing models
  - Ongoing royalties – typically based on a percentage of chip price
  - Technology reused across multiple applications
- Long-term, secular growth markets

>1,440 licences
Growing by >100 every year

17.7 bn ARM-based chips in FY2016

~15% CAGR over previous 5 years

>460 potential royalty payers
Industry leaders and high-growth start-ups; chip companies and OEMs



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

History of ARM

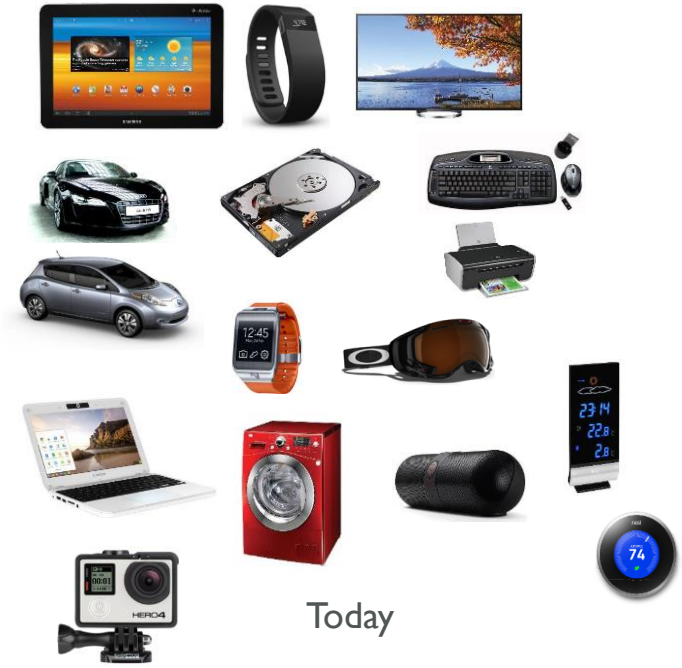
Joint venture between Acorn Computers and Apple

1990

Designed into first mobile phones and then smartphones

1993 onwards

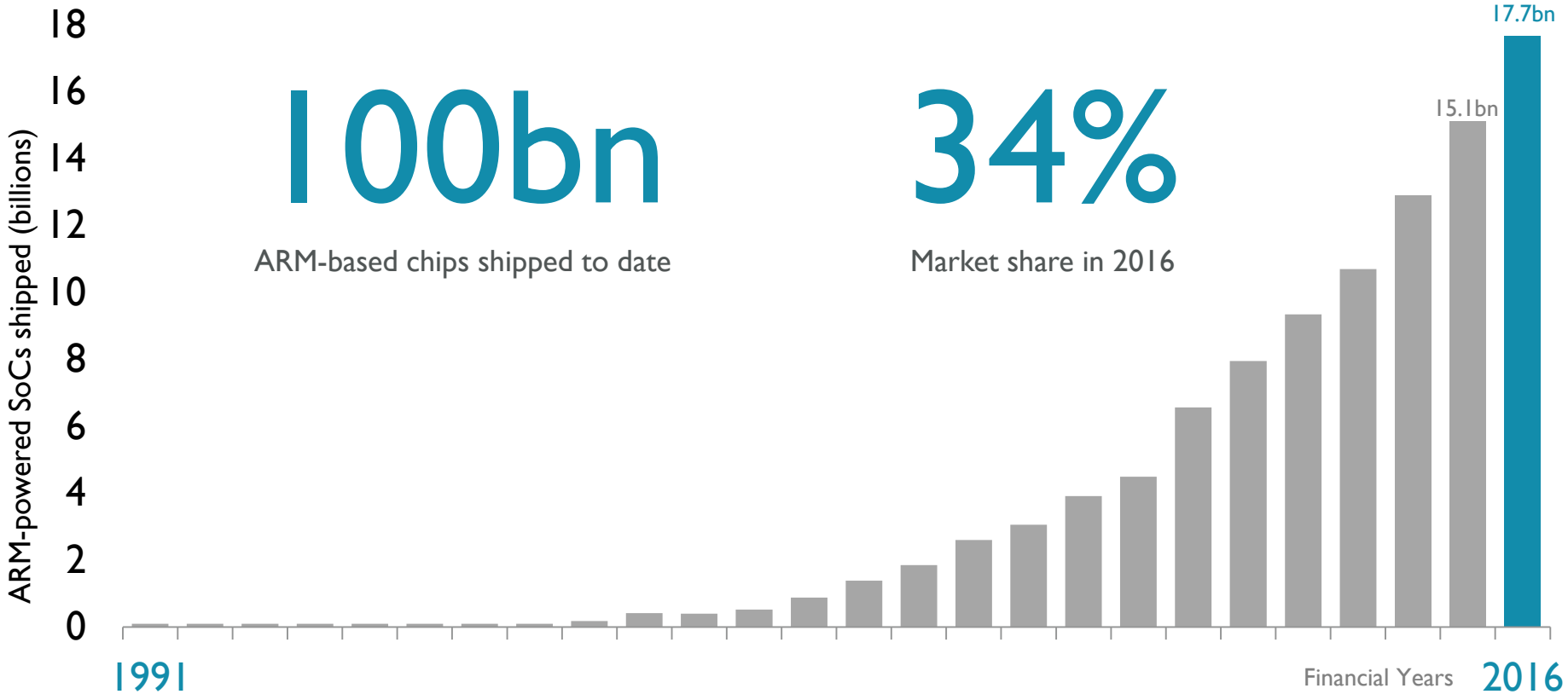
Now all electronic devices can use smart ARM technology



Today

ARM

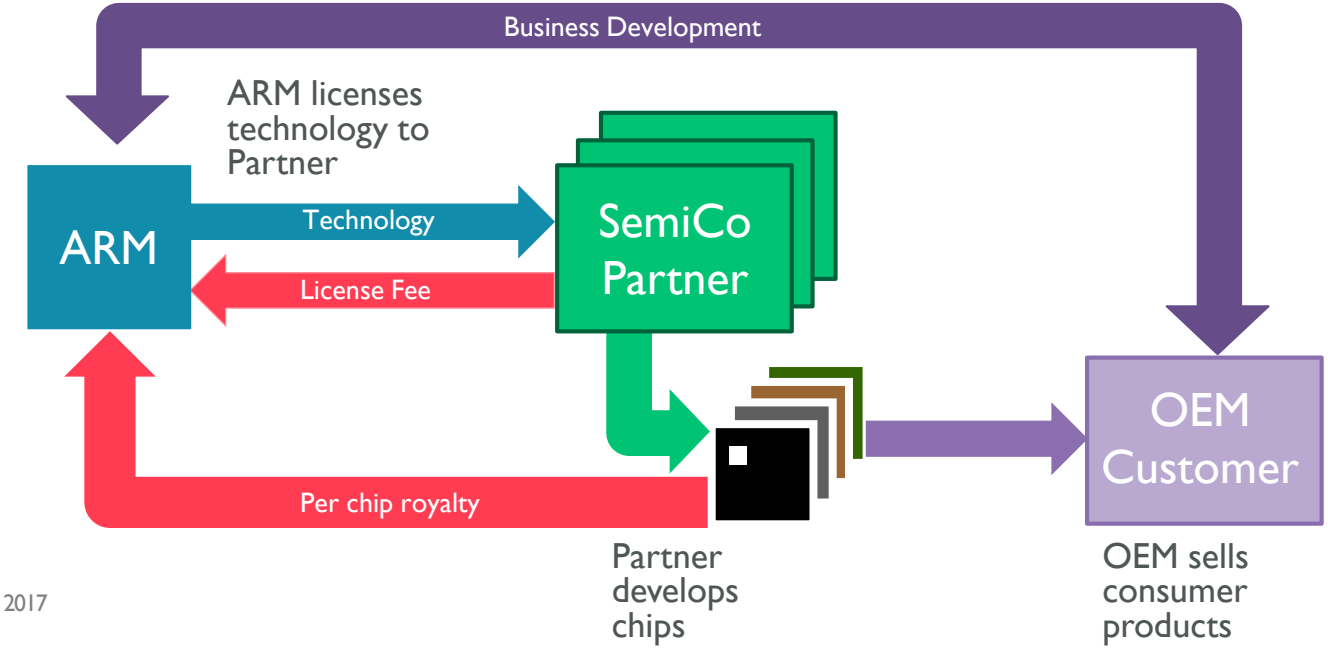
ARM-based chip shipments



ARM

ARM 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



From Revenue to Profits

FY 2016 Revenues	$m	£m	%revs
Licensing	601	437	34%
Royalty	974	751	59%
Software and Services	114	83	7%
Total	1,689	1,271	**100%**

Costs (£m)		667
Adjusted EBITDA (£m)		**604**
Operating Margin		48%
Other expenses (£m)		292
IFRS EBIT (£m)		**312**

Over 95% of revenues earned in US dollars

Royalties are a growing proportion of revenues

10% move in $/£ impacts profits by ~15% (forex impacts £ revenues *and* costs)

Strong revenue growth has driven operating margins and profits

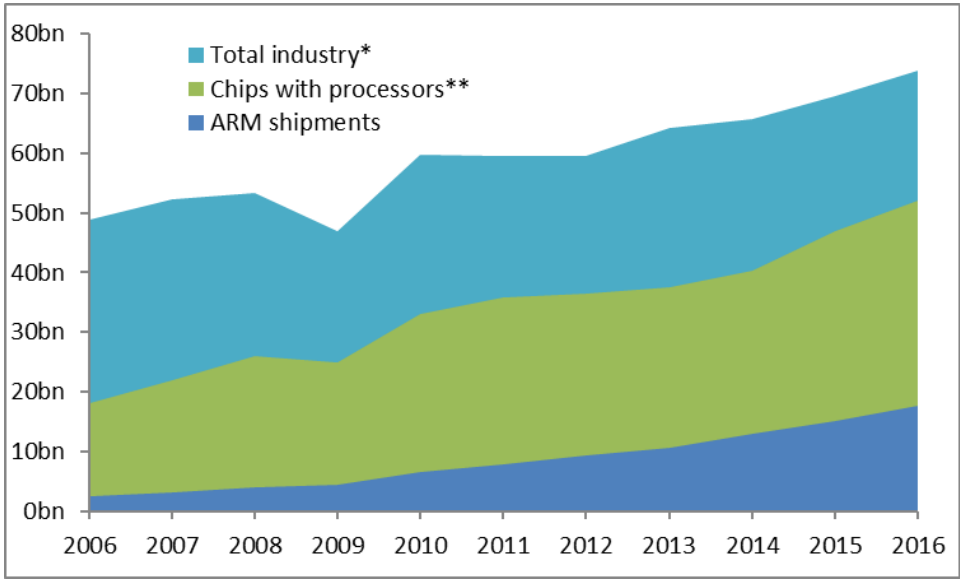
Includes expenses incurred by ARM during acquisition by SoftBank.
Excludes SoftBank's acquisition related expenses. Excludes amortisation of intangibles related to the acquisition.

Financial numbers aligned with SoftBank reporting periods (01 April 2016 to 31 March 2017)

ARM

ARM's opportunity continues to broaden

- Semiconductor industry continues to grow – 4% by volume, 1% by value over past 5 years
- Proportion of chips with processors is increasing – 70% in 2016
- ARM is gaining share within the "chips with processors" segment of the industry – 34% in 2016



* Data source: WSTS, March 2017 and ARM, Industry volume excluding analog and memory

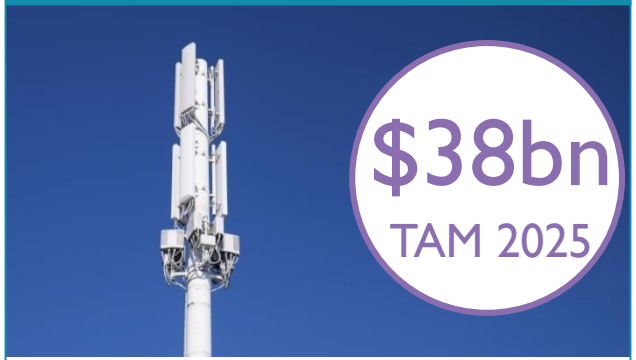
** ARM estimates

ARM's main growth markets

Application Processors

- Smartphones, tablets and laptops
- Apps processor, modem, connectivity, touchscreen and image sensors
- Apps processor: Increasing proportion using ARM technology with higher royalty per chip from ARMv8-A, octa-cores, graphics and physical IP

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

Embedded Markets

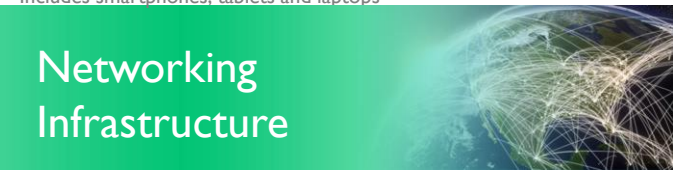
- Automotive, white-goods, wearables, smart devices in industrial and utilities
- Microcontrollers, smartcards, embedded connectivity chips
- 200 companies have licenced ARM processors for use in embedded intelligent devices

ARM

ARM's expanding opportunity

Mobile Application Processors

Includes smartphones, tablets and laptops



Networking Infrastructure

Servers

Embedded Intelligence

Includes microcontrollers, smartcards and non-mobile connectivity. Excludes automotive

	Share 2016*	TAM 2016	TAM 2025
Mobile Application Processors	90%	$20bn	$30bn
Networking Infrastructure	17%	$13bn	$18bn
Servers	<1%	$15bn	$20bn
Embedded Intelligence	30%	$23bn	$40bn

* 2016 ARM Market Share by Volume
† Total Available Market (TAM)

ARM

ARM's expanding opportunity

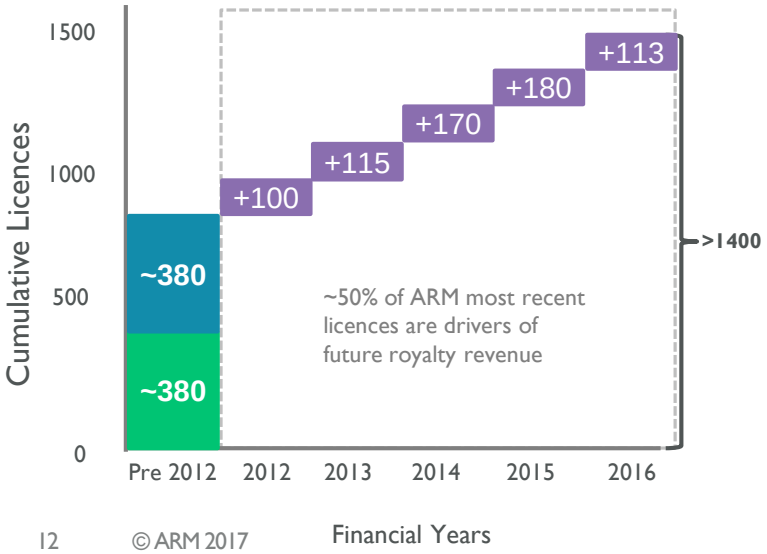
	Share 2016*	TAM 2016	TAM 2025
Automotive	10%	$11bn	$17bn
Automotive Application Processors and Automotive Controllers			
Other Mobile Chips	45%	$14bn	$18bn
Modems, WiFi/BT, GPS, NFC, sensor hubs, image sensors, eMMC, etc…			
Consumer Electronics	35%	$20bn	$25bn
Includes Desktop PCs, DTVs and STBs			
Chips into Other Markets	40%	$7bn	$10bn

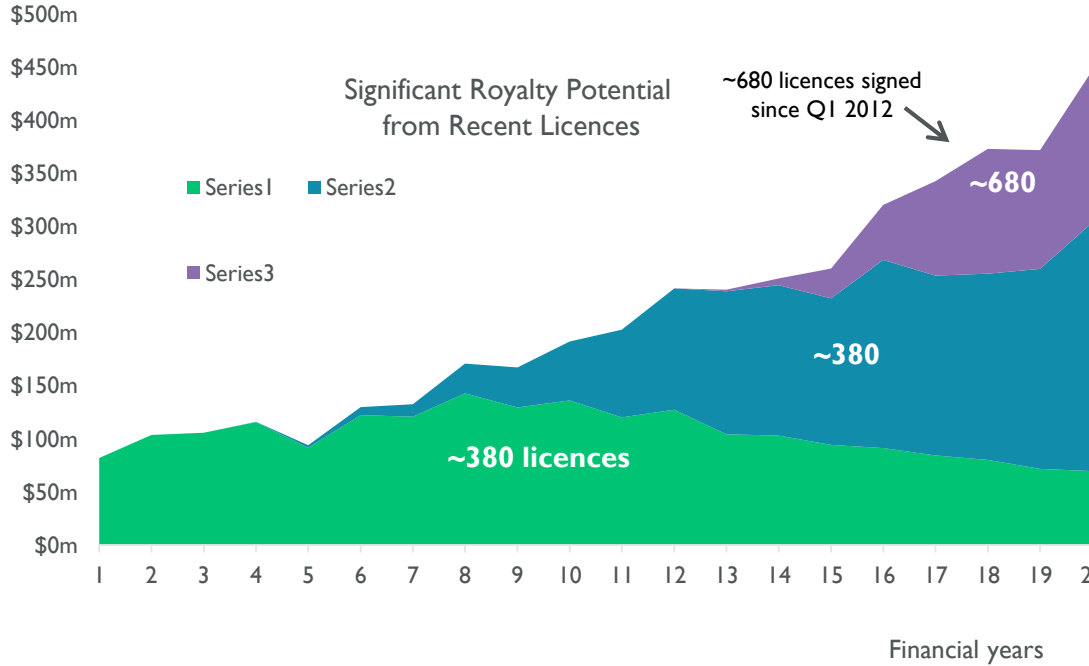
* 2016 ARM Market Share by Volume
† Total Available Market (TAM)

ARM

Licensing enables future royalties

- ARM signed 113 licences in FY2016
- ARM's current royalty revenues are derived from licences signed many years ago
- Growing base yields royalty revenues over long period





Licensing drives market share

ARM gains share by winning designs at leading semiconductor companies

		2016* Share
Mobile Applications Processors **		90%
Networking Infrastructure		17%
Servers (ARMv8-A based)		<1%
Embedded Intelligence		30%
Automotive		10%
Other mobile chips		45%
Consumer electronics		35%
Chips into other markets		40%
3D Graphics		50%

- Shipping mainly ARM-based chips
- Shipping some ARM-based chips
- Public ARM design wins, but not yet shipping
- No ARM design win or not yet public

Change in three quarters

- → 11 companies re-equipped
- → 3 companies re-equipped
- → 1 company acquired ARM shipper

Based on current market shares and ARM's view of how these markets may develop.

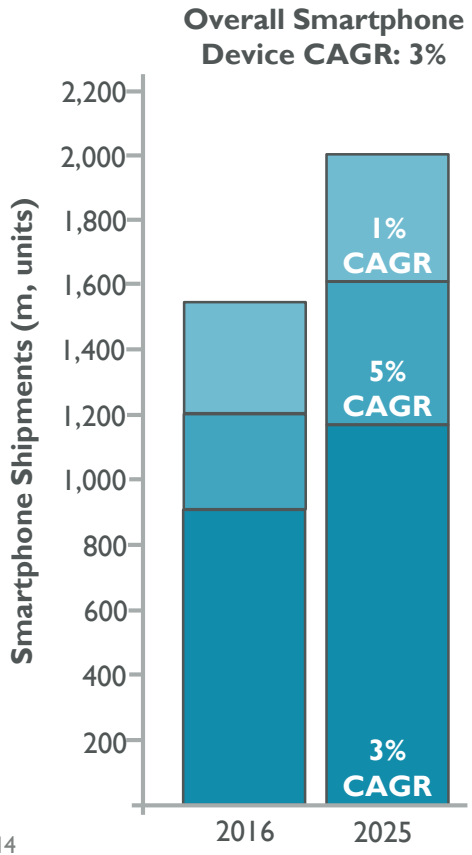
ARM will update the chart on the left only when design wins become public

*** Financial year**

**** Includes smartphones, tablets and laptops**

ARM

2025 opportunity in smartphones



2020 Smartphone Chips

Applications Processor	$15-$20	
Connectivity, Sensors	$5-$10	
Applications Processor	$5-$15	
Connectivity, Sensors	$2-$3	
Applications Processor	< $5	
Connectivity	$1-$2	

ARM's advanced technology commands a higher royalty percentage per chip

Smartphone penetration in FY2016

- ARMv8-A technology: 70%
- Mali graphics: 50%
- High core count: 35%

Additional opportunities to grow royalty percentage

- Mali video, imaging and display technology
- Computer vision
- Virtual/augmented reality
- Physical IP
- Machine learning inference
- Increased connectivity

Premium Smartphones

Mid-range Smartphones

Entry-level Smartphones

>5% Smartphone Royalty Growth

Source: Gartner and ARM

ARM

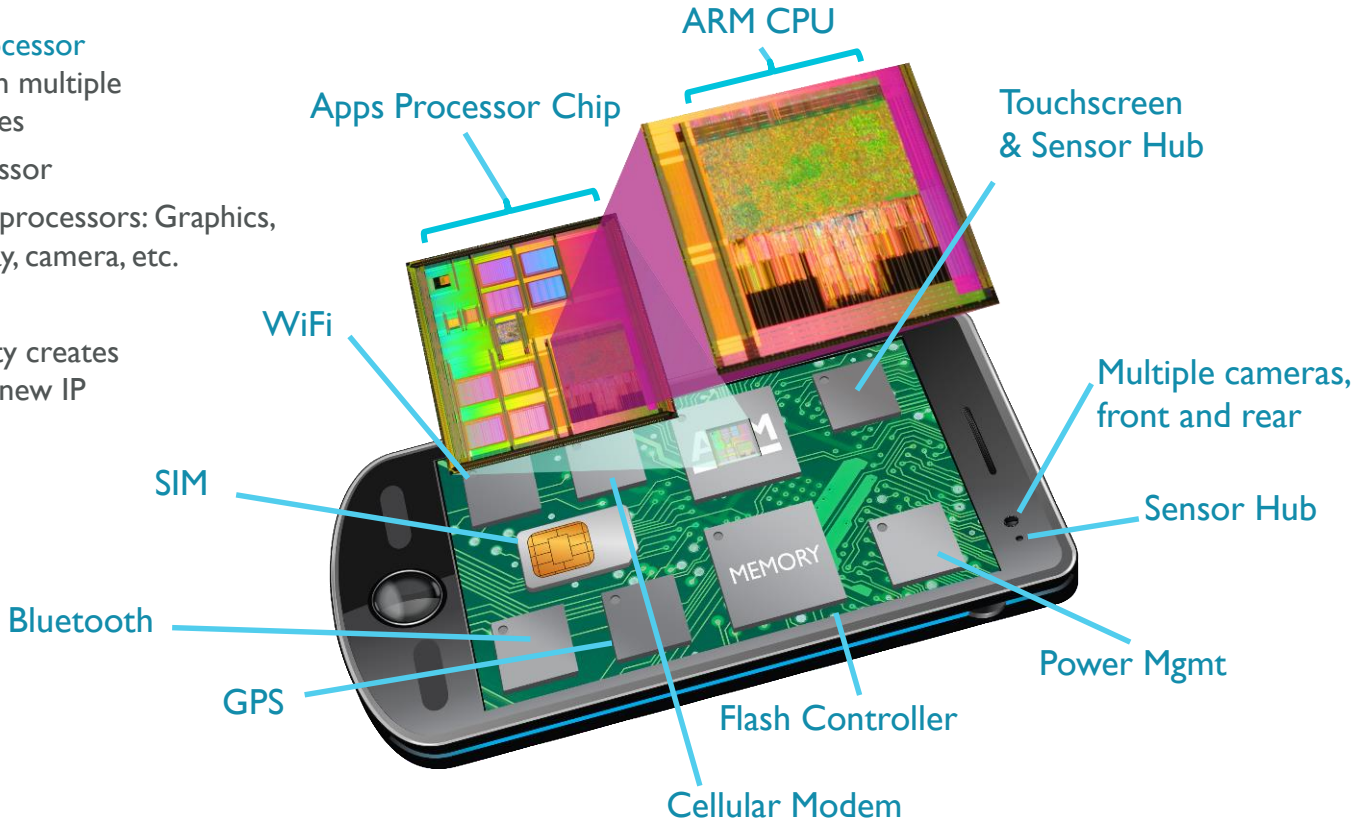
2025 opportunity in smartphones

Advanced consumer products are incorporating more and more ARM technology

Applications Processor chips can contain multiple ARM technologies

- ARM Processor
- Multimedia processors: Graphics, video, display, camera, etc.
- Physical IP

New functionality creates opportunity for new IP

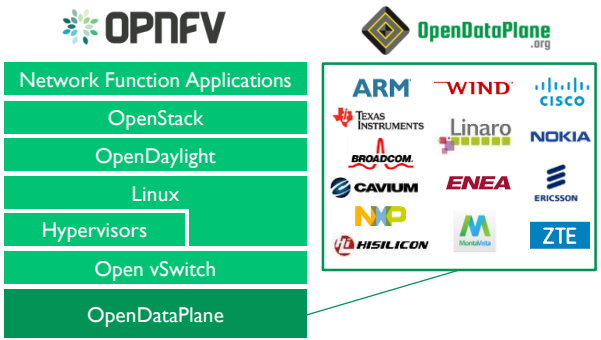


Networking infrastructure opportunity for ARM

- 5G networks will provide
  - High-speed, low latency connectivity consumers
  - High-volume low-data rate connectivity for IoT
- 5G will need heterogeneous network equipment for macro- to femto-cells
- Distributed virtualised functions enables efficient use of the network
- ARM is working with software community to expand availability of virtualised network functions

Major networking chip manufacturers have licensed ARM technology

Network functions are being optimised for ARM-based SOCs



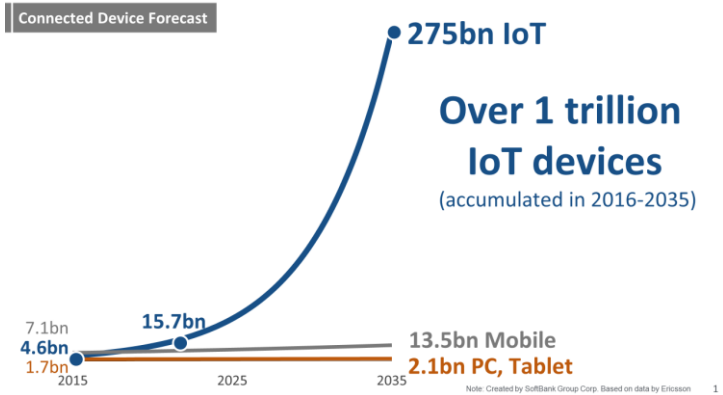
Server opportunity for ARM

- Web/cloud scale companies can reduce costs with servers optimised for specific workloads
- ARM business model enables increased innovation and differentiation
- Increasing design wins in HPC, webhosting, machine learning and analytics
- New workloads (i.e. containers and microservers) are ideal for ARM multicore approach

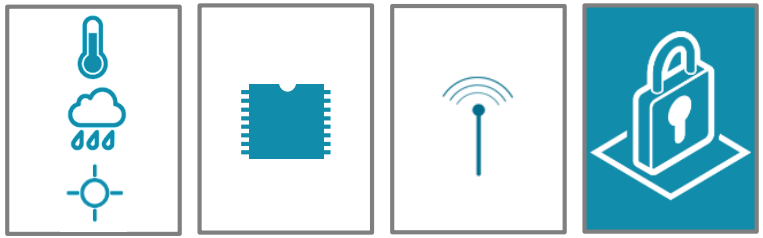
Barcelona Supercomputer selects ARMv8-A for Mare Nostrum 4

Fujitsu and RIKEN select ARMv8-A for the Post-K supercomputer

Internet of Things opportunity



Every Internet of Things device needs:



ARM has high share of technology components needed to create a smart, secure connected device

- >75% market share — advanced* microcontrollers
- >60% market share — wireless connectivity
- >90% market share — advanced* smartcards

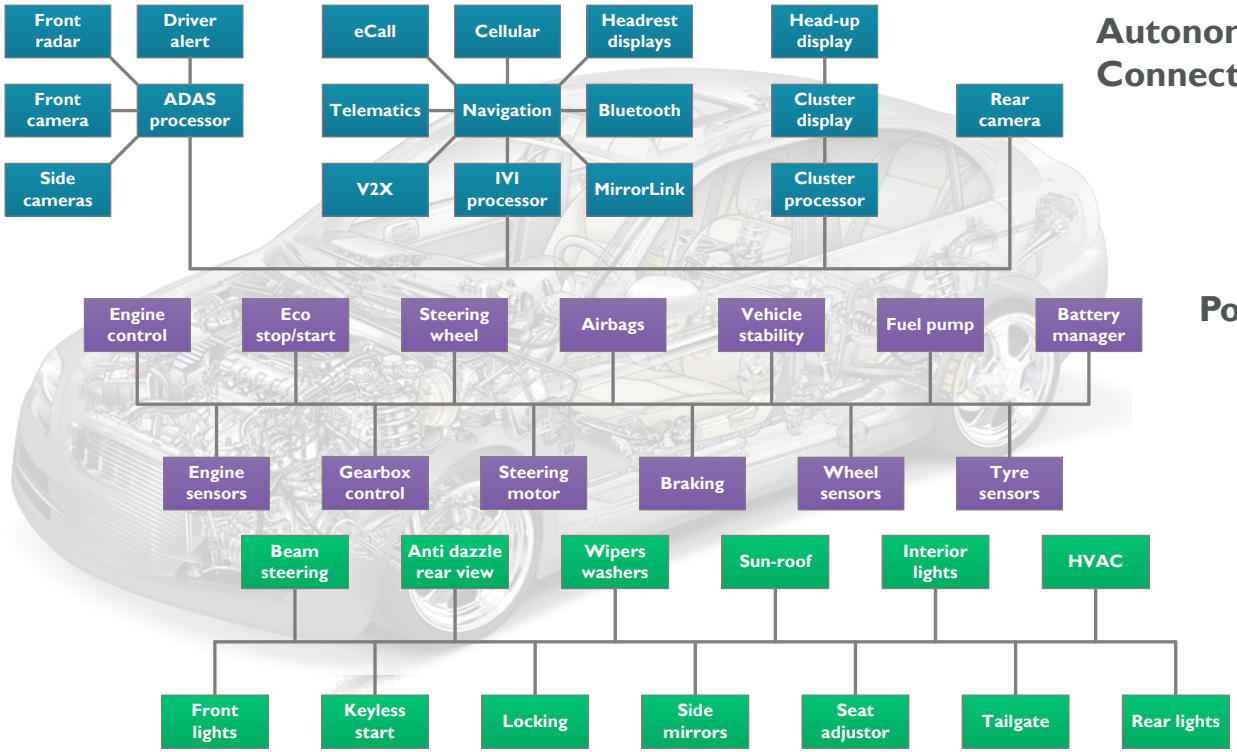
ARM-based technology is the platform for many Internet of Things devices

- >90% market share — wearables
- >90% market share — drones
- >50% market share — connectivity in cars

* Advanced 32-bit devices

ARM's automotive opportunity

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

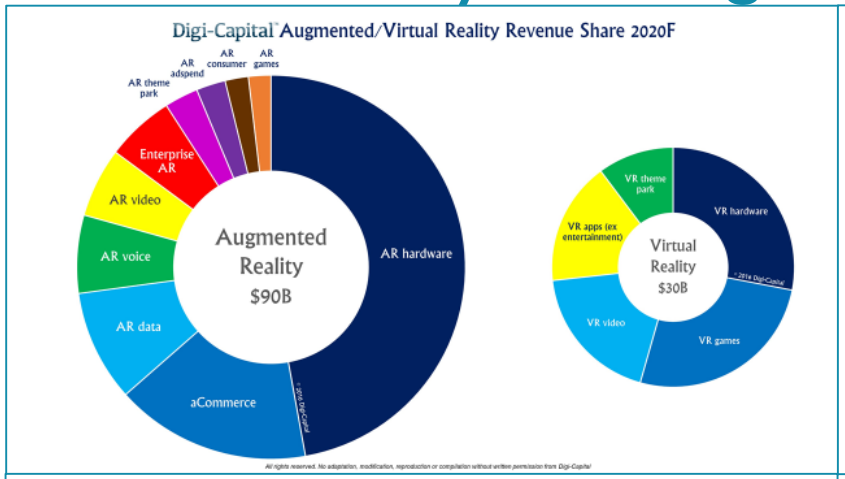


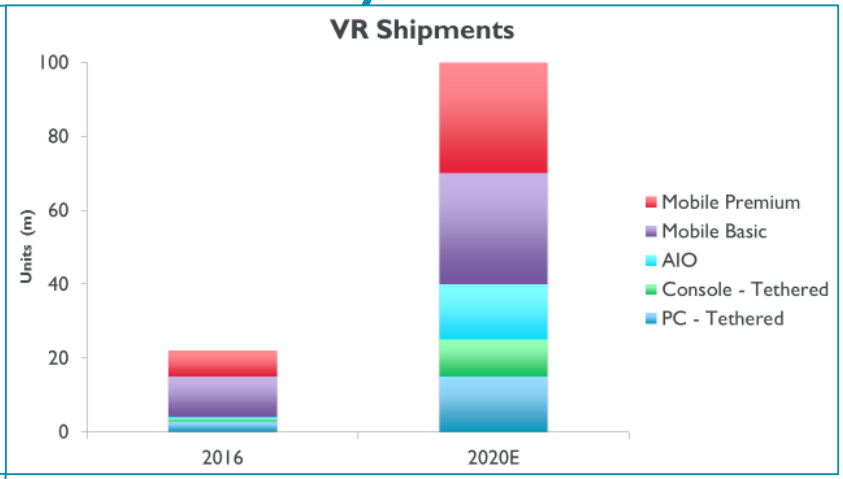
Autonomous driving, ADAS, Cluster, Connectivity

Powertrain, chassis

Body electronics, sensors, actuators, communications

Virtual reality and augmented reality





Requirements for smooth mobile AR/VR

High resolution	2k to 4k per eye
High performance	60fps (120fps with asynchronous "Timewarp")
Responsive rotation & position tracking; Increases immersion & experience	<20ms "motion to photon" 6 degrees of freedom
Mobile power envelope	~4W TDP

ARM

Mali is #1 VR graphics processor

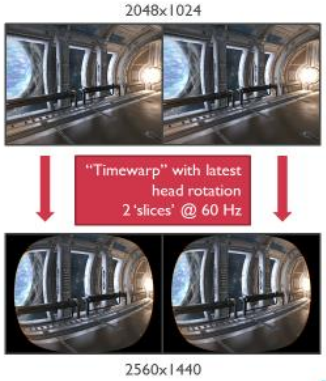
Mali graphics processor is used in around 50% of all VR head-mounted displays including some:

- Samsung Gear VR
- Google Cardboard VR and
- Other all-in-one VR HMDs

Virtual reality and augmented reality

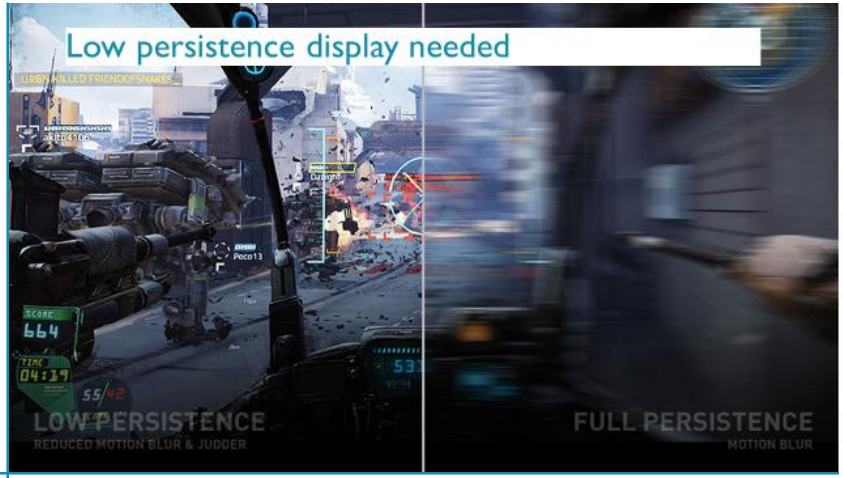
Asynchronous timewarp

- Decouple rotation from graphics pipeline
- Draw larger scene than needed and determine scene to display at the last moment

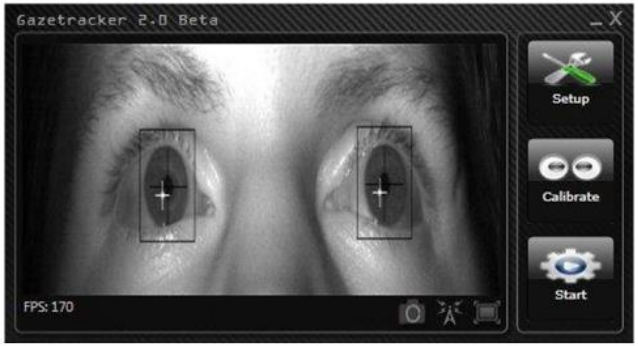


ARM

Low persistence display needed



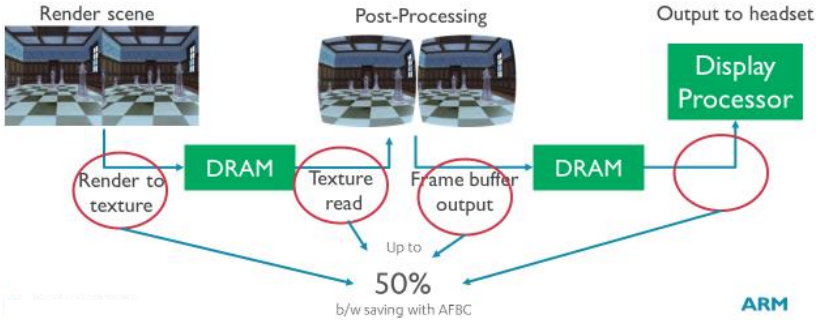
Gaze Tracking and Foveated Rendering



Render in full resolution quality where gaze is directed

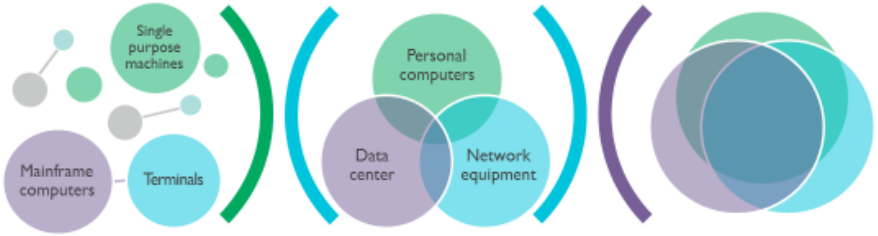
ARM's Frame Buffer Compression for low power

Post processing step/barrel distortion doubles fragment bandwidth



ARM

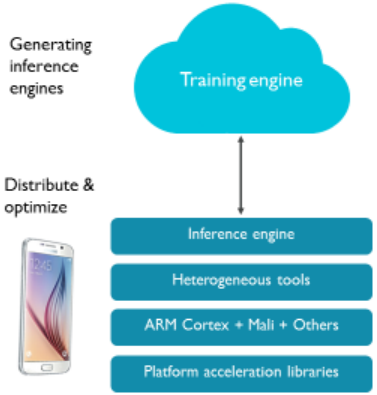
Machine learning in client devices

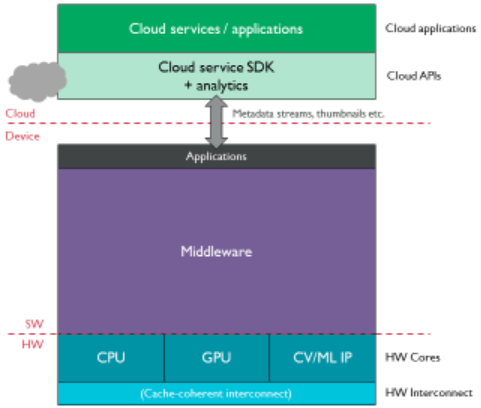


1970 to 1995
Personal Computers

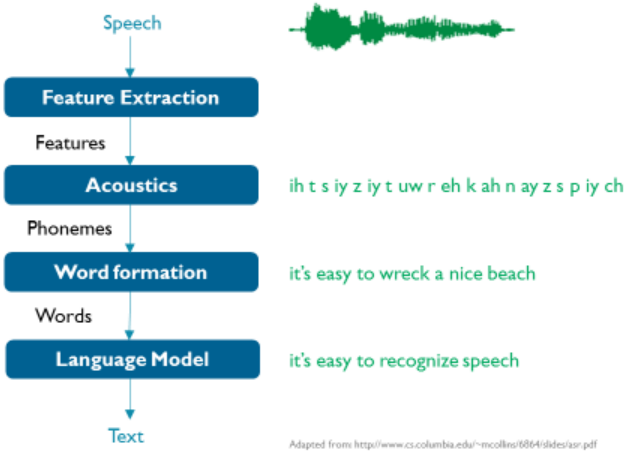
1995 to 2020
Connected Computers

2020 to 2045+
Learning Systems





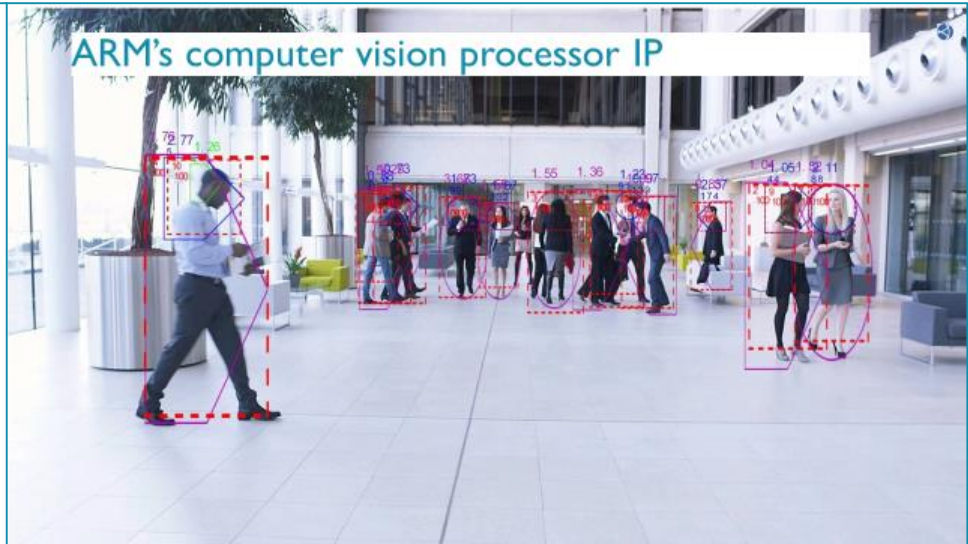
The speech recognition process



Adapted from: http://www.cs.columbia.edu/~mcollins/6864/slides/asr.pdf

ARM

ARM's computer vision processor IP

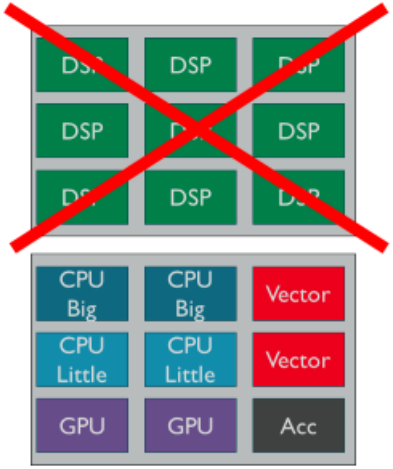


Computer Vision Algorithms

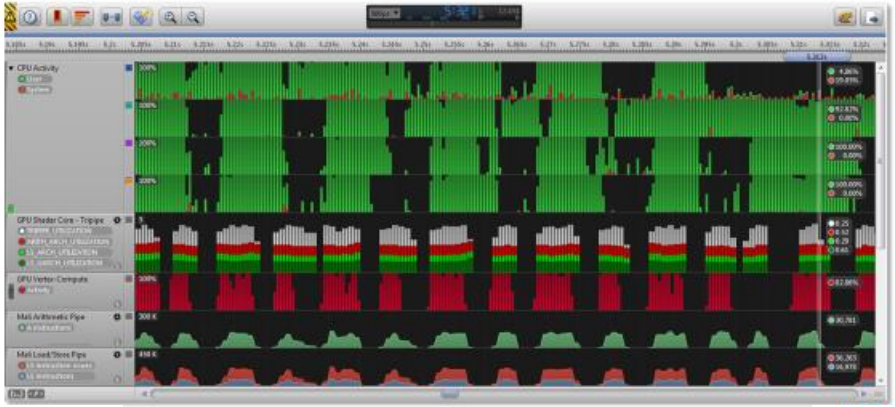
	Detection (Binary Present/Not Present)	Classification (Few/broad classes)	Recognition (Many specific)	Motion Detection	Motion Estimation/Tracking	Pose Estimation	Segmentation	Depth Perception	Egomotion	Noise Reduction	Content Generation/Removal
Viola-Jones/Haar Cascade	X			X							
Image Histogram		X				X					
Template Matching (OCR)	X	X		X							
Histogram of Oriented Gradients (HoG)	X	X									
Eigenfaces/Eigenvectors	X	X				X					
Keypoint Features (SIFT/SURF/FAST/Harris)	X	X	X		X	X					
Convolutional Neural Networks	X	X	X								
GMM Background/Foreground Segmentation				X			X				
Sparse Optical Flow (Lucas Kanade)				X	X				X		
Dense Optical Flow (Gunner Farneback)				X	X		X	X	X		
Stereo depth perception (Block Matching)								X			
Registration (Homography, Stereo Matching)						X		X	X		
Clustering (k-means, EM, mean-shift)							X				
Graph Cuts							X	X			
Watershed							X				
Deconvolutional Neural Network							X				
Filters (Gaussian Blur, Median)										X	
Image Averaging										X	
Inpainting											X
Seam Carving											X

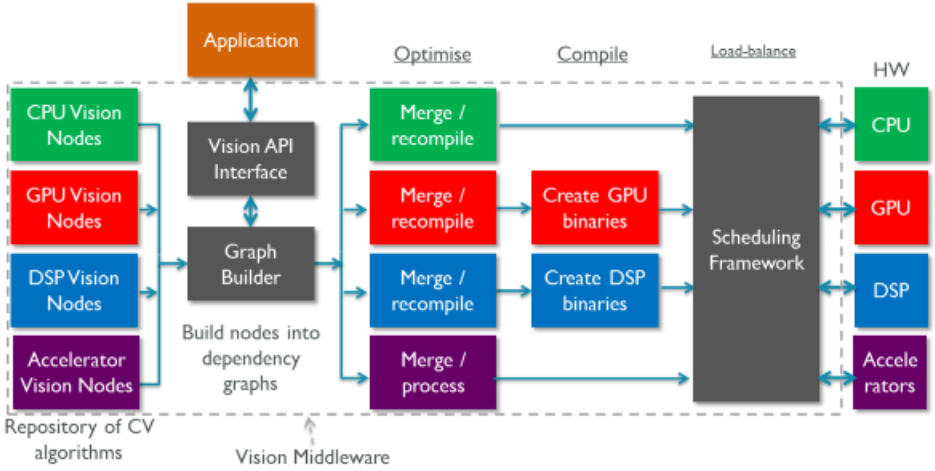
One size doesn't fit all

- Need multiple types of processors
- Fixed function works for some algorithms
  - Requirements known in advance, algorithm well understood, high performance needed
- But programmable cores are essential



Whole-system optimisation





Qtr ending Mar. 2017 – Financial summary

Revenues ($m)	Q4 2015	**Q4 2016**	Growth
Licensing	148	**122**	-18%
Royalty	197	**258**	31%
Software and Services	34	**29**	-15%
Total ($m)	379	**409**	8%
Revenues (£m)			
Licensing	101	**93**	-8%
Royalty	137	**208**	53%
Software and Services	23	**22**	-4%
Total (£m)	261	**323**	24%
COGS, R&D, SG&A (£m)	130	**190**	46%
Adjusted EBITDA (£m)	131	**133**	2%
Other operating expenses (£m)	22	**(19)**	
Depreciation & amortisation	9	**20**	44%
IFRS EBIT (£m)	100	**132**	32%

Licensing can fluctuate between quarters
Q4 licensing within expected range

Very strong royalty revenue growth
ahead of long-term historic growth rates

Sterling revenues benefitted from a 13% fall in value of Sterling vs US Dollar

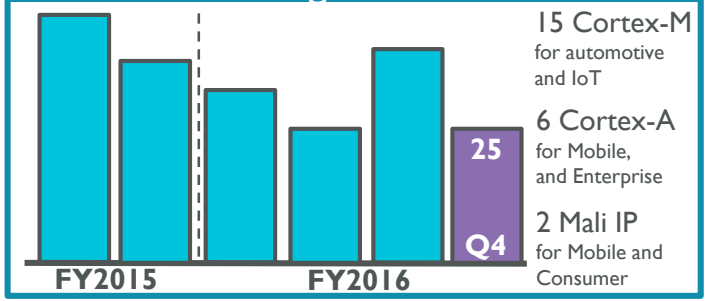
19% increase in total headcount
Currency impact of US-based employees
New long-term remuneration scheme

Excluding amortisation of intangibles relating to acquisition of ARM by SoftBank

ARM

Qtr ending Mar. 2017* – Progress against strategy

Licences signed for broad range of end markets

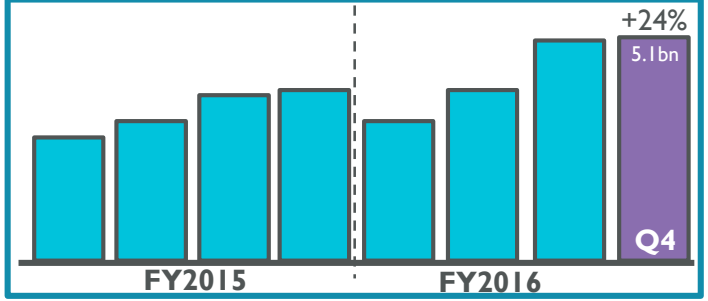


15 Cortex-M
for automotive and IoT

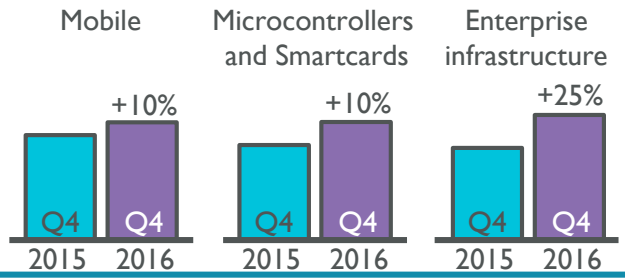
6 Cortex-A
for Mobile, and Enterprise

2 Mali IP
for Mobile and Consumer

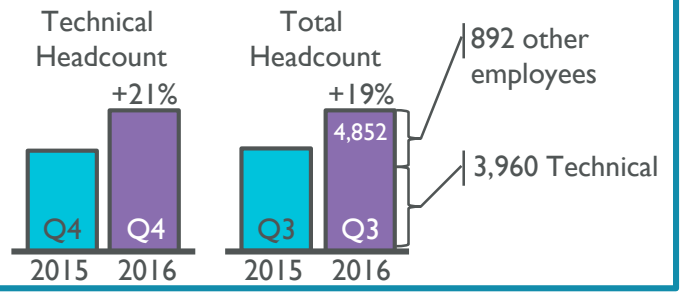
Reported Royalty Units Growing



Key market performance (growth in reported royalty units)



Investing in Future Technology



* SoftBank's financial year runs from April 01 to March 31.

ARM

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More content available on our website

- Most quarters ARM hosts a series of investor events.
  Recordings of these events are available on the ARM investor website at www.arm.com/ir
- Currently available:
  - Intelligent buildings whitepaper by Ani Deodhar, Segment marketing manager for IoT Solutions
  - Machine learning in client devices presentation by Jem Davies, General Manager of ARM's Media Products Group
  - Route to 10nm by Ron Moore, VP Marketing for ARM's Physical IP Group
  - Accelerating artificial intelligence with Nandan Nayampally, General Manager of ARM's Compute Products Group

Meeting ARM in May and June 2017

Event	Location	Date	Broker
Technology Conference	Hong Kong	22-23 May	Exane
Roadshow	Tokyo	24-25 May	SoftBank organised
Reverse roadshow	Cambridge	26 May	Goldman Sachs
Computex	Taipei	31 May	ARM organised
Roadshow	Hong Kong	1-2 June	UBS
Technology Conference	San Francisco	5-6 June	Stifel
TMT Conference	London	6-7 June	BAML
Roadshow	Chicago	7 June	Canaccord
Roadshow	Toronto	8 June	Canaccord
Roadshow	New York	9 June	Credit Suisse
Roadshow	Madrid	14 June	Santander
Roadshow	Paris	15 June	Natixis
Reverse roadshow	Cambridge	16 June	Citi
Technology conference	London	20 June	JP Morgan
SoftBank AGM	Tokyo	21 June	SoftBank organised
Roadshow	Singapore	22-23 June	Bernstein

ARM

ARM IR Updates

- The ARM IR team sends out regular updates on news and technology trends

- To register for these emails, visit:

www.arm.com/ir-emails

ARM

Investor Relations email updates

To be notified of forthcoming ARM investor events, please enter your details below.

You will receive:

- Invitations to ARM webinars produced specifically for the investment community
- A quarterly alert with ARM's upcoming schedule for investor roadshows and conferences
- Alerts about ARM events for professional investors (e.g. management appearances at industry trade shows)

This distribution list is intended to alert investors and financial analysts about ARM's IR activity. Private investors are welcome to register and join our investor webinars, but please note that some of the events advertised via this distribution list will be open to professional investors only.

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