ARM® Cortex™ - A Processors
Integrated, delivering and performing
Enabling the next 20 billion units from under $1 to over 2GHz

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ARM
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ARM Vision

A world in which all electronic products and services are based on energy-efficient technology from ARM, making life better for everyone.
ARM Technology

ARM technologies range from processor and multimedia IP to software for advanced digital products.

- **Processor IP** – Design of the brain of the chip
- **Physical IP** – Design of the building blocks of the chip
- **Software development tools**
ARM Architecture Evolution

Key Technology Additions by Architecture Generation

- ARM V5
- ARM V6
- ARM V7 A&R
- ARM V7 M

Execution Environments: Improved memory use

Improved Media and DSP

Low Cost MCU

ARM9™
ARM10™

ARM11™

VFPv2
Jazelle®

Thumb®-2
TrustZone™
SIMD

Thumb-EE
VFPv3
NEON™
Adv SIMD

Thumb-2 Only
ARM V7 A&R
ARM V7 M

ARM Architecture for the Digital World®
NEON Technology for Emerging Media

NEON provides flexible, universal media acceleration for emerging applications and formats

- Windows Media
- On2
- real
- DIVX Video
- MPEG-2
- mp4
- H.264

Which formats will be popular in 2011?
What applications will be running on mobile devices?

Advanced GUI  Speech Recognition  VOIP and Video Calling  Emerging Video Formats  Games
ARM Cortex Advanced Processors

Architectural innovation, compatibility across diverse application spectrum

**ARM Cortex-A family:**
- Applications processors for feature-rich OS and 3\textsuperscript{rd} party applications

**ARM Cortex-R family:**
- Embedded processors for real-time signal processing, control applications

**ARM Cortex-M family:**
- Microcontroller-oriented processors for MCU, ASSP, and SoC applications

Unparalleled Applicability
Cortex-A Applications processors

ARM Cortex-A
“Low-Power Leadership”

Cortex-A8
- Today’s volume silicon baseline
- NEON multimedia engine
- 1000DMIPS@500MHz+ in 65LP

Cortex-A9
- Technology leadership
- Second generation 1-4X SMP
- 4x1500DMIPS@600MHz+ in 40LP

Cortex-A5
- Optimized for Volume PPA, A9
- 80% more DMIPS/mw than ARM11/9
- 4x1500DMIPS@1GHz+ in 40G

Cortex-A15
- 2.5GHz+ in 28HP

Performance
Functionality
Efficiency

Osprey

Frequency figures are representative
Cortex-A8 – Today’s Volume Baseline

High-performance applications processor in volume production
- Superscalar pipeline offers 2.0 DMIPS/MHz
- Thumb-2 for high performance, dense code
- Integrated, configurable L2 Cache with ECC

Architecture extensions for CPU and system security
- TrustZone for secure transactions and digital rights management (DRM)

Multimedia and Signal Processing Architecture
- NEON provides over 2x performance of ARMv6 SIMD

Available now in mass production
Cortex-A9 – Next-Gen Performance

Leadership performance and power efficiency, scalable technology
- Second generation 1-4X SMP technology
- Advanced pipeline with 2.5 DMIPS/MHz
- Optional floating-point and NEON units

New system-level integration features for design optimization
- Accelerator coherency port
- Generic interrupt control (GIC) and distribution system

Suitable for high-end enterprise through to wireless handsets

Available now in mass production
Cortex-A5 – Value and Volume PPA

Full Cortex-A9 compatibility in dramatically different PPA footprint
- Area comparable to ARM926
- Performance above ARM1176
- Power-efficiency dramatically improved
- Adds Cortex-A technology: Thumb2, NEON, high performance bus and TLBs

Highly configurable
- 1-4X cores, optional NEON & FPU
- ACP for coherent I/O, GIC

Reuse your HW, reuse your SW, reuse virtually everything

Available now
Cortex-A15 – Breakthrough Technology

- Breakthrough processor technology
  - 1.2+ GHz in 32/28LP with multi-issue, out-of-order, superscalar pipeline
  - 3.5 DMIPS/MHz per core
  - Significantly improved floating-point, NEON and stream performance
  - Integrated low-latency L2 and SCU
  - Performance and power scalability via 1-4X SMP

- Delivering key new features
  - Hardware enhanced OS virtualization
  - AMBA® 4 system coherency
  - Advanced power mgmt
  - 1 TB physical addressing
  - ECC protection on L1/L2

- Available 1H 2011
Connectivity Driving Growth

1st Era
- Mainframe: 1MM+ Units
- 1960

2nd Era
- PC: 1B+ Units/Users
- 1980
- Minicomputer: 10MM+ Units

3rd Era
- Mobile Internet: 10B+ Units
- The Internet of things: 100B+ Units
Collaboration - ARM and Microsoft

ARM and Microsoft have collaborated for over 14 years

First Microsoft support for ARM processor in 1997

ARM employees based in Redmond working closely with Microsoft

Microsoft is a contributor to the ARM Technical Advisory Board (TAB)
Cortex-A and Windows Embedded

- Animated Device Interfaces (UI)
- Connected Experiences
- Productivity Applications

Windows Embedded

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Osprey

Cortex-A5

Performance

Functionality

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ARM Cortex-A Applications processors for feature-rich OS and 3rd party applications

Frequency figures are representative
Investing in this Ecosystem

- ARM develops with Windows Embedded
  - Advanced Development Program
  - CE/Compact CPU validation and BSPs
  - GPU drivers for Mali

- Connected community ~800 companies
  - Silicon Partners
  - Design Support Partners
  - Software, Training & Consortia Partners

- ARM SiPs with Windows CE 6.x BSPs
ARM Partners Executing with CE

Majority of Embedded CE business on ARM

- Freescale silicon powers Ford SYNC™ system
- Freescale in Windows Embedded Automotive Development Kit
- Marvell powers Handheld Terminals Pharos, Intermec and Motorola
- Texas Instruments ARM926 core Sonosite M-Turbo Portable Ultrasound
Windows® Embedded Compact 7

- Full ARM V7 Support, including
  - ARM NEON SIMD Instructions
  - ARM SMP
  - Improved L2 cache utilization
    - e.g. Cached page table walk support
  - Compiler generated inline VFP instructions

- Target market segments include
  - Handheld Terminals
  - Automotive
  - DTV, STB & DMA
  - General embedded
  - ARM silicon partners with Compact 7 BSPs
Support the Latest Hardware Innovations

- Support ARMv7 architecture including NEON/VFP
- Support multi-core processors
- Support Hardware Acceleration
  - OpenGL-ES 2.0
  - DDraw

DDraw

SMP

Windows Embedded
Partner Silicon
A world in which all electronic products and services are based on energy-efficient technology from ARM, making life better for everyone.