

How to jump start your ARM-based IoT chip for free

ARM

Lifeng Geng
Embedded Segment Marketing
Manager

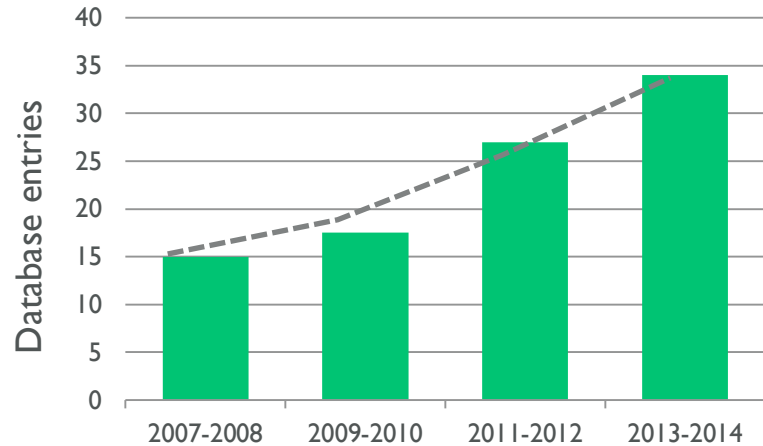
D&R IP-SoC Day - Shanghai
September, 2016

Trends in custom SoC design

- 15% CAGR of new custom SoC projects at IMEC IC-link

Questions:

- Where is this growth happening?
- What are the costs/benefits of building your own SoC?



Courtesy IMEC IC-link

New wave of innovation

Driving a new wave of custom SoC development

Sensor and mixed-signal companies:
integrated IoT solutions

Start-ups: innovative solutions

OEMs: reduce cost, reduce power, differentiate



Real example mixed-signal custom SoC from S3 Group



Smart industrial
sensor

Integration of discrete mixed-signal
components and ARM Cortex-M processor



Pressure & temperature sensing
Diagnostics
Motor control
Communications

Return on investment



Differentiation

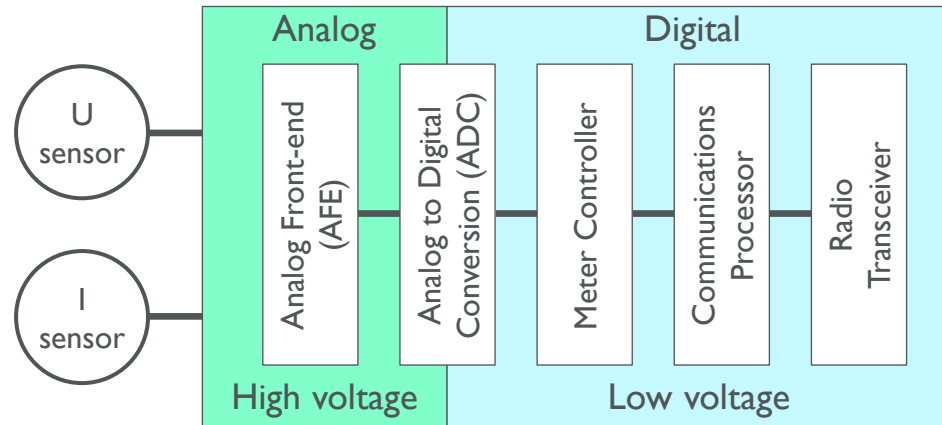
Control of
supply chain

85%
Reduction in
PCB area

90%
Reduction in
BOM

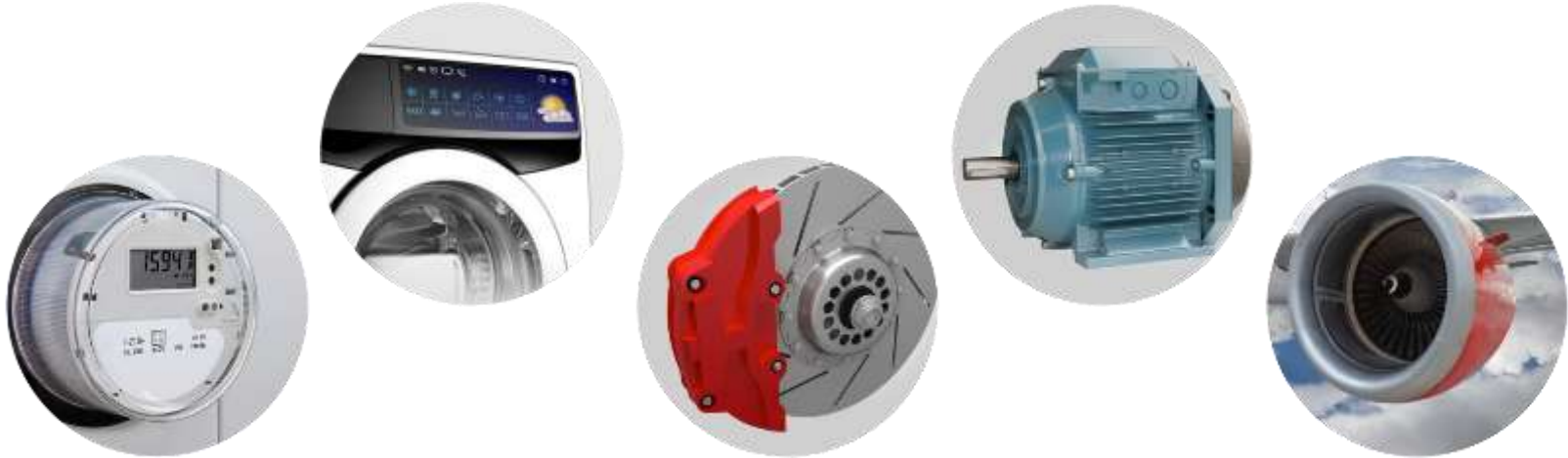
Example of differentiation by integration

- ESD tests required for certification
- Single-chip (metrology + metering application) reduces BOM cost
- Ample room for innovation

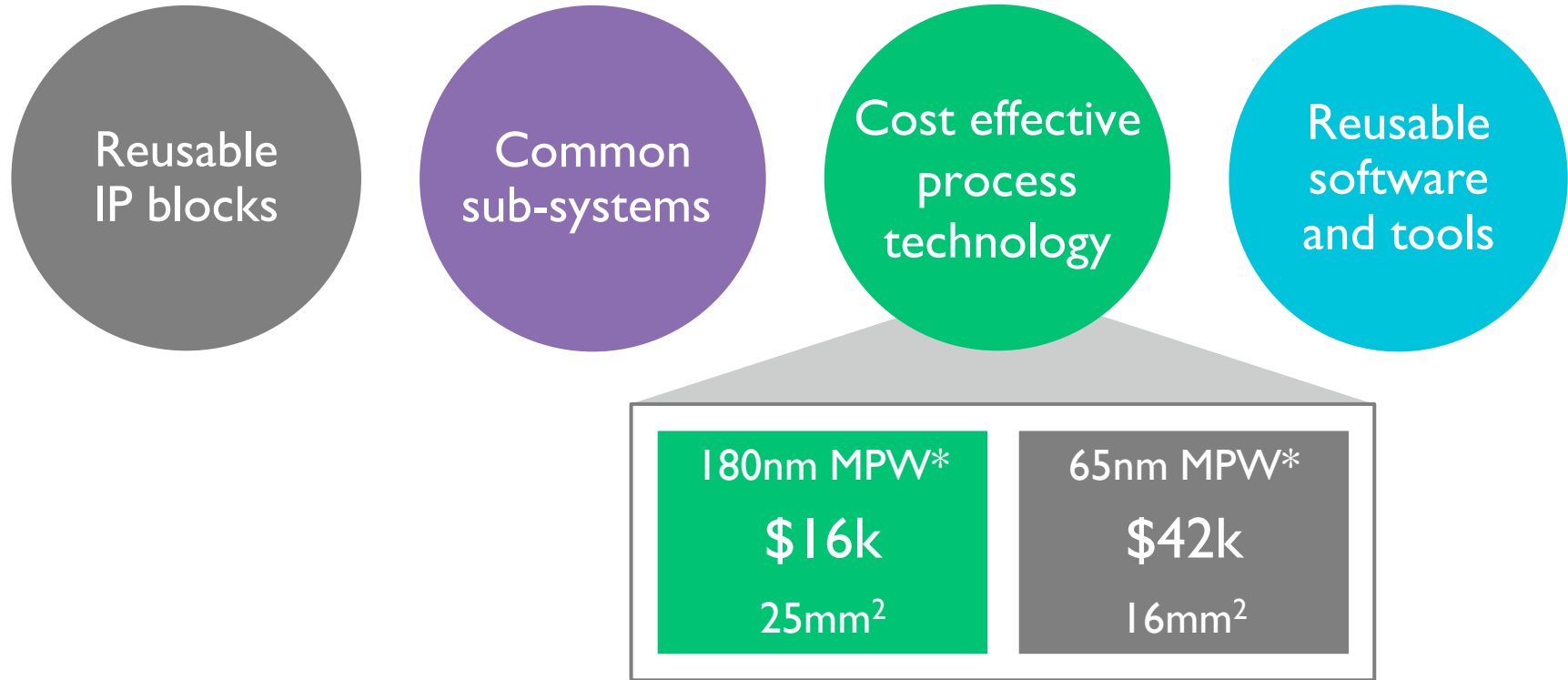


Control of supply chain

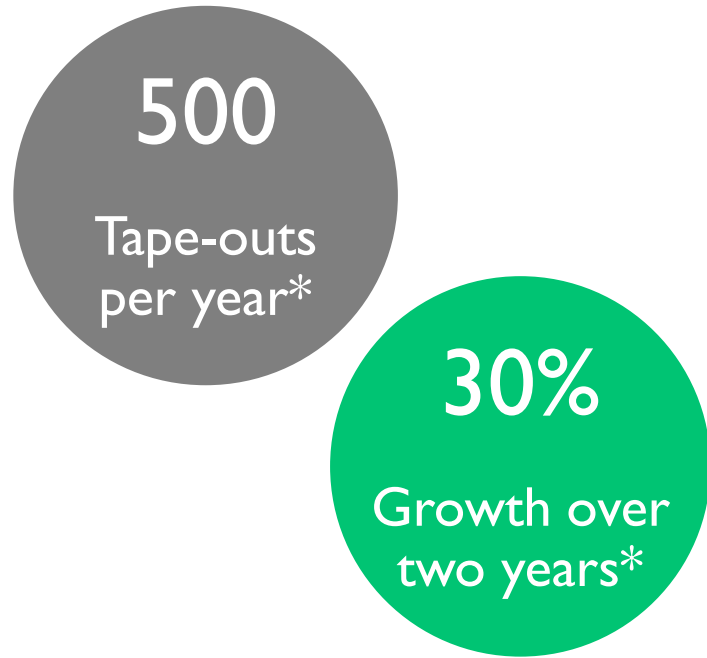
- Reliable long-term supply of components
- Supply chain risk reduction outweighs initial NRE cost



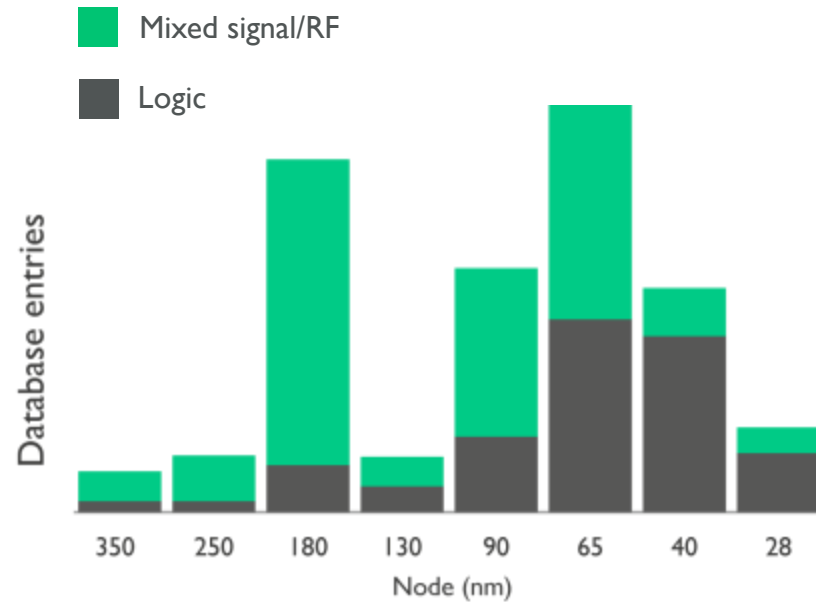
Cost-reduction benefits



Example: imec IC-link



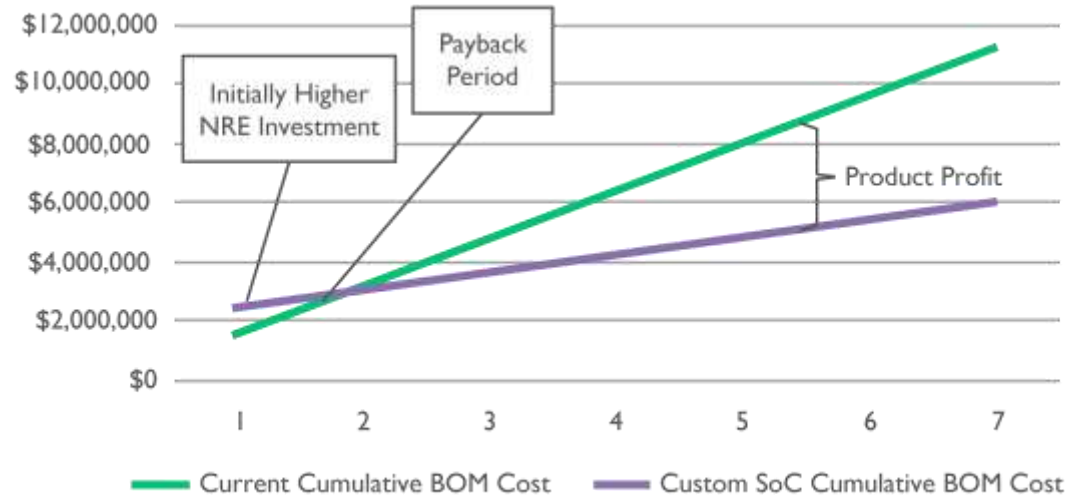
* Source: imec IC-link database 2014



Source: imec IC-link database, 2011 - 14

The cost of custom SoCs

- \$2.5M break even rule of thumb (according to S3 group)
- Initial NRE cost is offset after 12-18 months

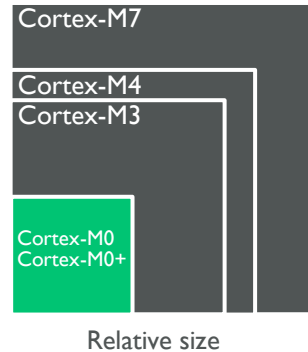
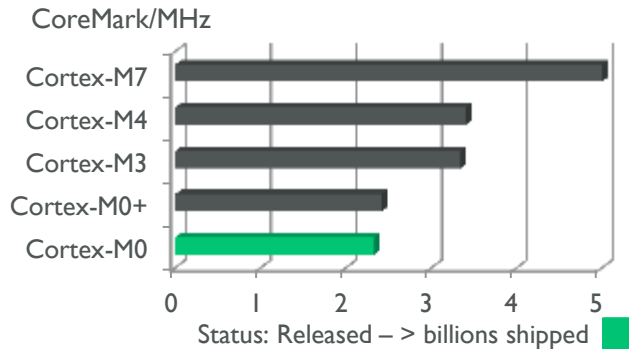
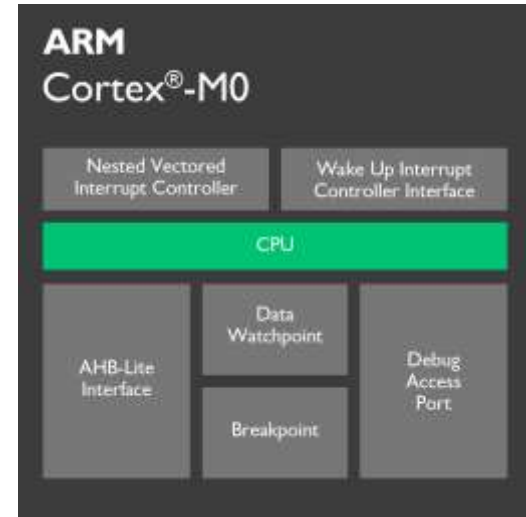


Courtesy of S3 group

Cortex-M0: Small, low-power processor

- A 32-bit processor in an 8/16-bit footprint
- ARM architecture for every application
 - Ultra low-power MCU and mixed-signal devices
 - Logic sequencer or FSM replacement on SoC
- Compatibility across the Cortex-M range

Cortex-M0 CPU at 40nm



ARM is accelerating innovation

Free access to an ARM Cortex-M0 processor system
for design and simulation

Low-cost, FastTrack \$40k license to design, manufacture,
and commercialize Cortex-M0 based products

A global network of ARM-enabled design houses for best-in-class
SoC development

DesignStart: Easy access to ARM IP

Design

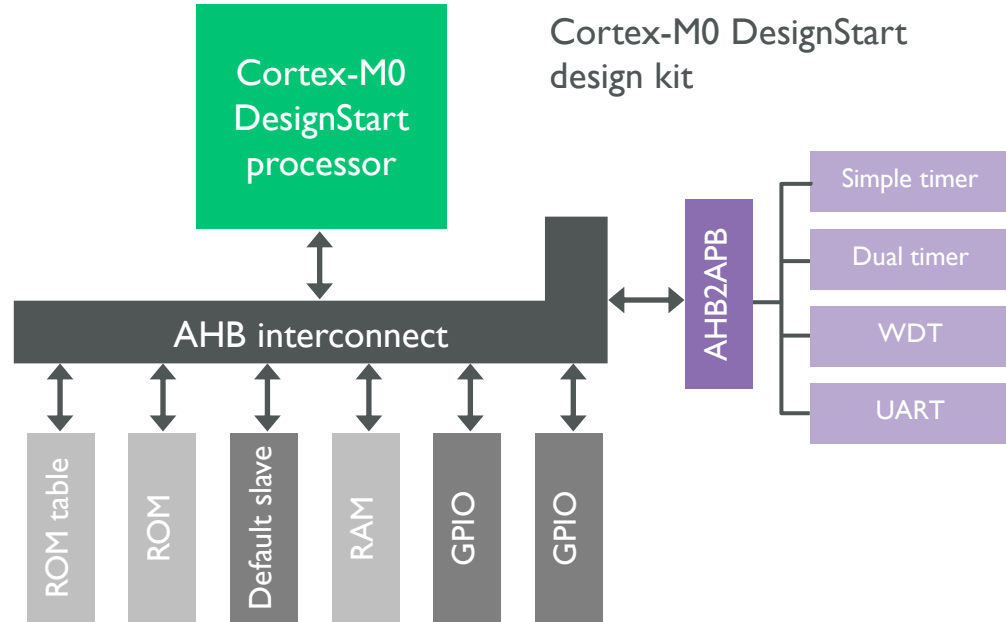
Prototype



- Download Cortex-M0 processor from ARM's DesignStart portal (designstart.arm.com)
- Includes system IP and tools to simplify system design:
 - Cortex-M0 processor*
 - Cortex-M0 System Design Kit (key components of SDK including system IP, peripherals, test bench and software)
 - ARM Keil MDK development tool for software development – 3 month license
 - Prototyping option on ARM supplied FPGA board (\$995)

What is the Cortex-M0 DesignStart design kit?

- Pre-integrated, pre-verified Cortex-M0 processor and AHB subsystem
- Designer can use own memory macros
- Peripherals can be customized



Easy and low-cost path to commercialization

Produce

- New fast track \$40k simplified licensing package
 - Makes it easy to move to next stage of product development
- Package includes system IP and tools to simplify system design:
 - Cortex-M0 processor
 - Cortex-M0 System Design Kit (including system IP, peripherals, test bench and software)
 - Keil MDK development tool for software development
 - 1 year support and maintenance



ARM DesignStart: Fast Path to Silicon

IP



EDA tooling



Know how

ARM

cādence[®]

**Mentor
Graphics**



- Free design & simulation of Cortex-M0
- \$40k fast track, simplified commercials

- Free evaluation
- Simplified and quick access to EDA tooling

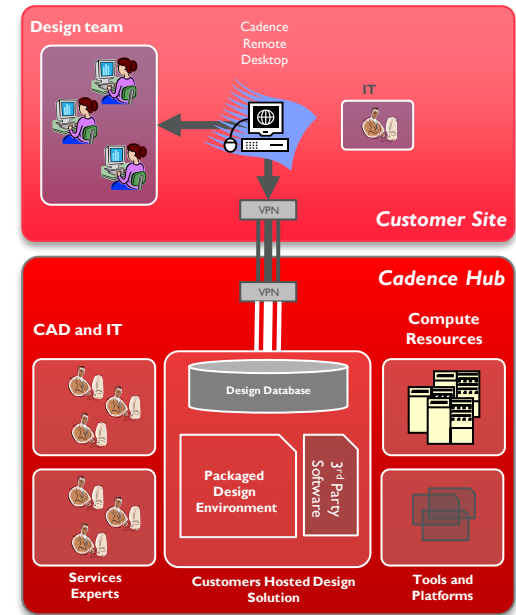
- Recommended by ARM
- Design partners you can trust

Cadence Hosted Design Solutions

Easy entry vehicle for IoT development

- **Productivity**
 - Start to design from day one in proven environment
 - Screen sharing between multiple sites, teams, & contractors
 - Design and methodology support
- **Flexibility**
 - Work from any location
 - Environment upgrade on demand: hardware, storage, licences
- **Support**
 - Application support without need for testcase creation
 - 24x7 IT support

Proven, secure,
hosted EDA tools



Tanner™ AMS by Mentor Graphics®



- **Tanner AMS:** a complete, end-to-end mixed-signal IC design flow. Design, implement, and verify
- **Virtual Lab:** Experiment with the Tanner AMS tool suite on an ARM® Cortex®-M0 based design in the Mentor cloud at no cost
- **Implement:** Take advantage of a complete, low-cost tool bundle from Tanner
- **Affordable & straightforward path:** for sensor, actuator, and MEMS creators to build custom SoC's for the emerging IoT market

Summary

- IoT's diverse nature has created opportunity for hardware innovation
- Custom SoCs at mature nodes are cost-effective and are accessible by wide range of companies, beyond traditional semiconductor companies
- We can expect to see more innovation through custom SoCs
- **Kickstart your IoT SoC design with Cadence Hosted Design Service, Mentor's Tanner EDA and ARM Cortex-M0 DesignStart**
designstart.arm.com

ARM

Thank you

The trademarks featured in this presentation are registered and/or unregistered trademarks of ARM Limited (or its subsidiaries) in the EU and/or elsewhere. All rights reserved. All other marks featured may be trademarks of their respective owners.

Copyright © 2015 ARM Limited