arm

Arm's Architecture Approach to Reusable Chiplets

Chiplet Summit
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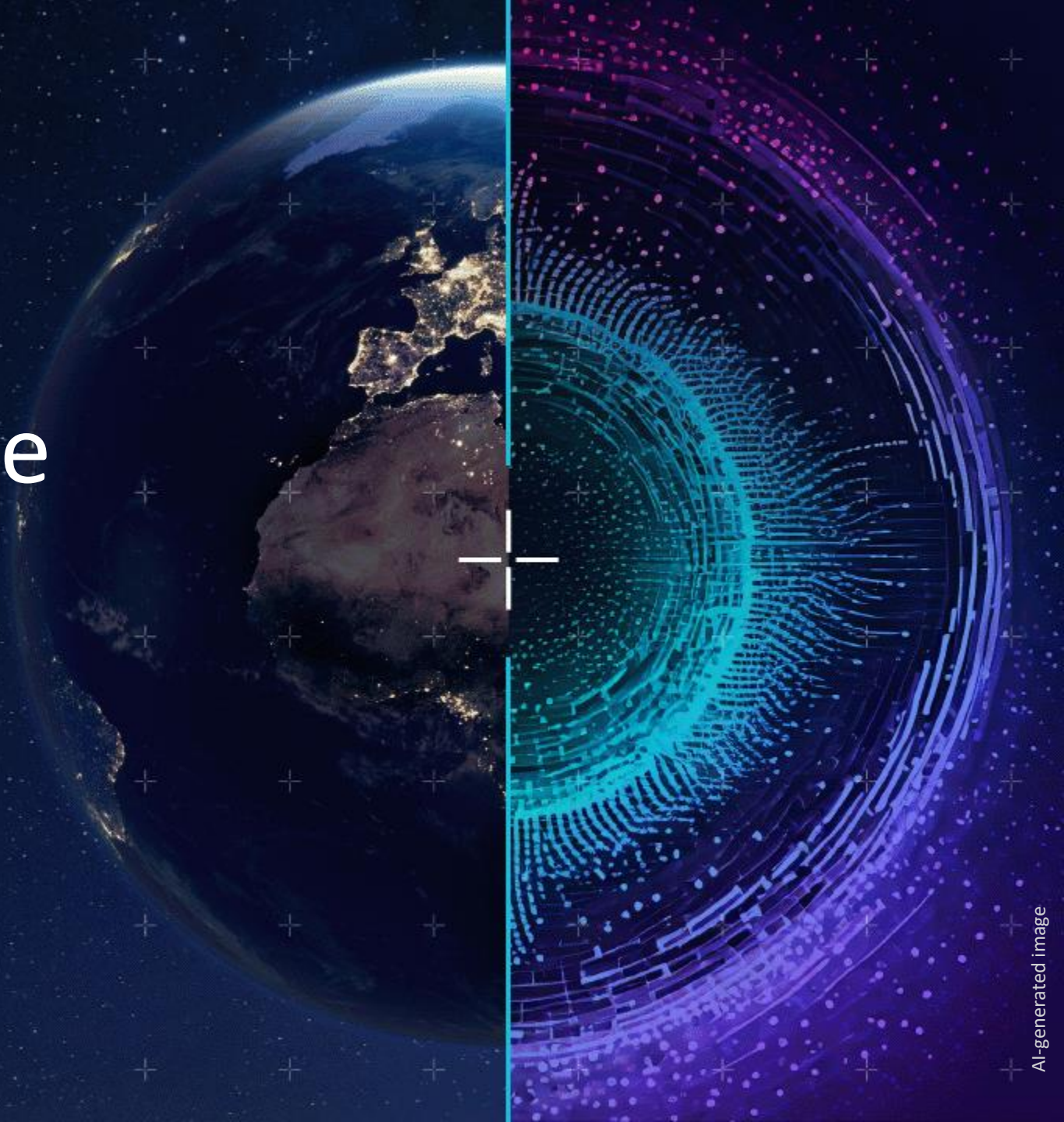


AI-generated image

Chiplets Offer New Opportunity

Lower design costs, higher yield, fewer defects, scalability, reuse, and faster time to market is incredibly attractive.

Empower the next generation of silicon designers with a flexible route to “custom silicon” - unlocking new opportunities.

Chiplets: Built on Arm

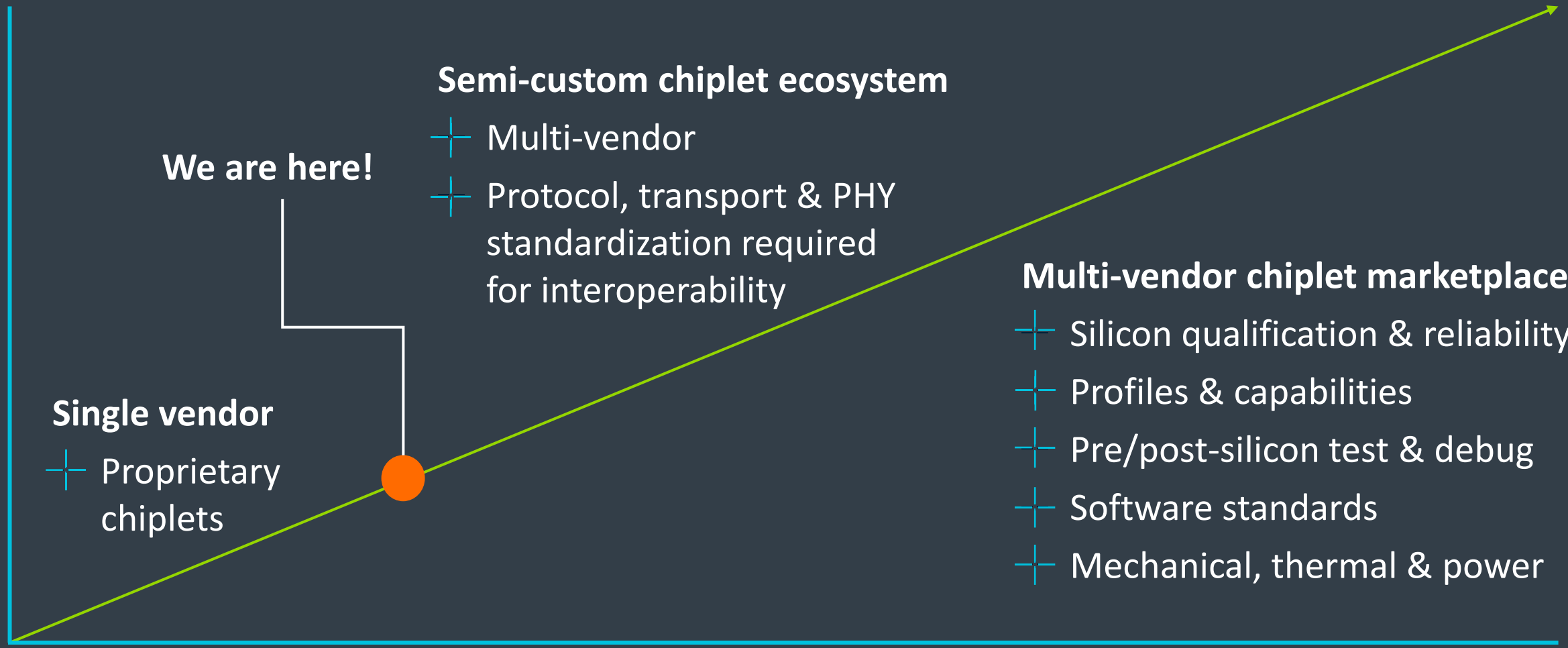
Infrastructure

- AWS announces AWS Graviton4 - the most powerful and energy-efficient AWS processor, built on Chiplet technology.
- Socionext, Arm and TSMC announce development of an innovative power-optimized 32-core CPU Chiplet in TSMC's 2nm silicon technology.

Automotive

- Renesas unveils automotive SoCs and MCUs processor roadmap with advanced in-package Chiplet integration technology built on Arm.
- MediaTek and NVIDIA collaborate to transform automobiles using Chiplet technology.

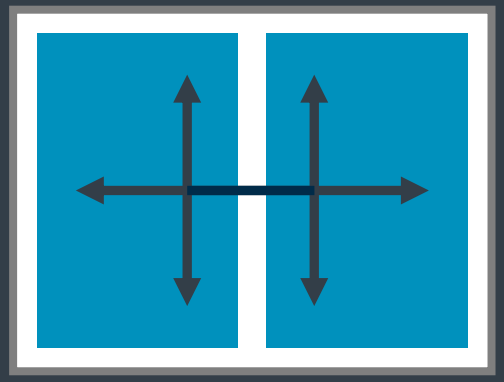
The Road to an Open Chiplet Marketplace



Arm’s Architecture Approach to Reusable Chiplets

Key standardization initiatives driving ecosystem collaboration

Protocols



Extending existing on-chip AMBA protocols for use between Chiplets

Partitioning

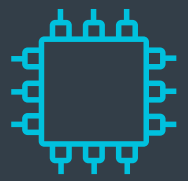
Guidance to partition Arm-based systems across Chiplets

Collaboration

Reuse and continue to collaborate on existing standards

Partitioning Arm Systems to Span Multiple Chiplets

System Architectures evolve to support reusable chiplets within the Arm ecosystem



Define Chiplet Types

- Classify chiplet types, properties, and functional requirements within an Arm system.
- Establish a common language to enable partners to collaborate on multi-dye systems.
- Identify system-level chiplet interfacing requirements.

Interoperability

- Standardize Chiplet interfaces and connectivity.
- Encourage consistency whilst enabling valuable differentiation.
- Simplify Chiplet specification and integration.

Reuse

- Establish Chiplet interface versioning and compatibility guidance.
- Enable Chiplets to be designed independently of systems.

AMBA Specifications

The standard for SoC communications underpinning the IP marketplace & fabless design today

Key Specifications

CHI
Coherent Hub Interface

AXI
Adv. eXtensible Interface

AHB
Adv. High-performance Bus

APB
Advanced Peripheral Bus

Ecosystem

Benefits

Thriving ecosystem & comprehensive marketplace

Common standard for a variety of designs:

- Flexibility and scalability
- Design reuse and low-friction integration
- Reduced TCO and TTM

Widely adopted open standard:

- Freely available & platform independent
- Long heritage of dependability & trust
- Billions of devices over 27+ years

Moving Forward With AMBA CHI C2C

New extension to CHI being developed

Layered architecture

No protocol conversion

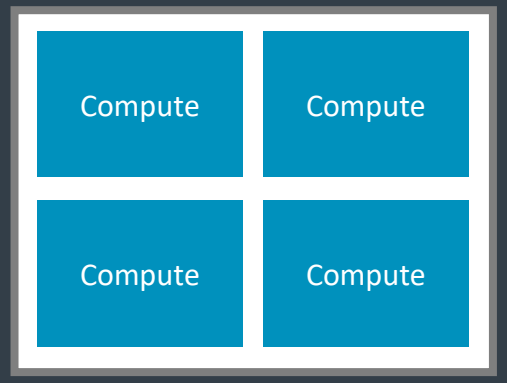
Optimizations for link utilization & latency

Developed in lock step with on-chip CHI

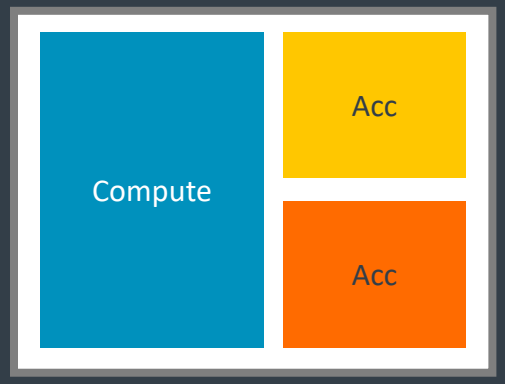
Typical Use Cases

AMBA CHI C2C provides a unified interface for device attach (compute, accelerators, mem…)

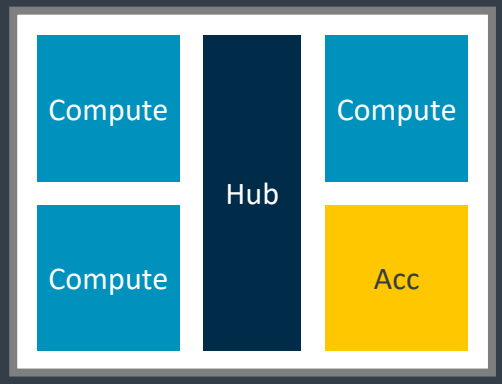
Coherent SMP



Accelerator Attach

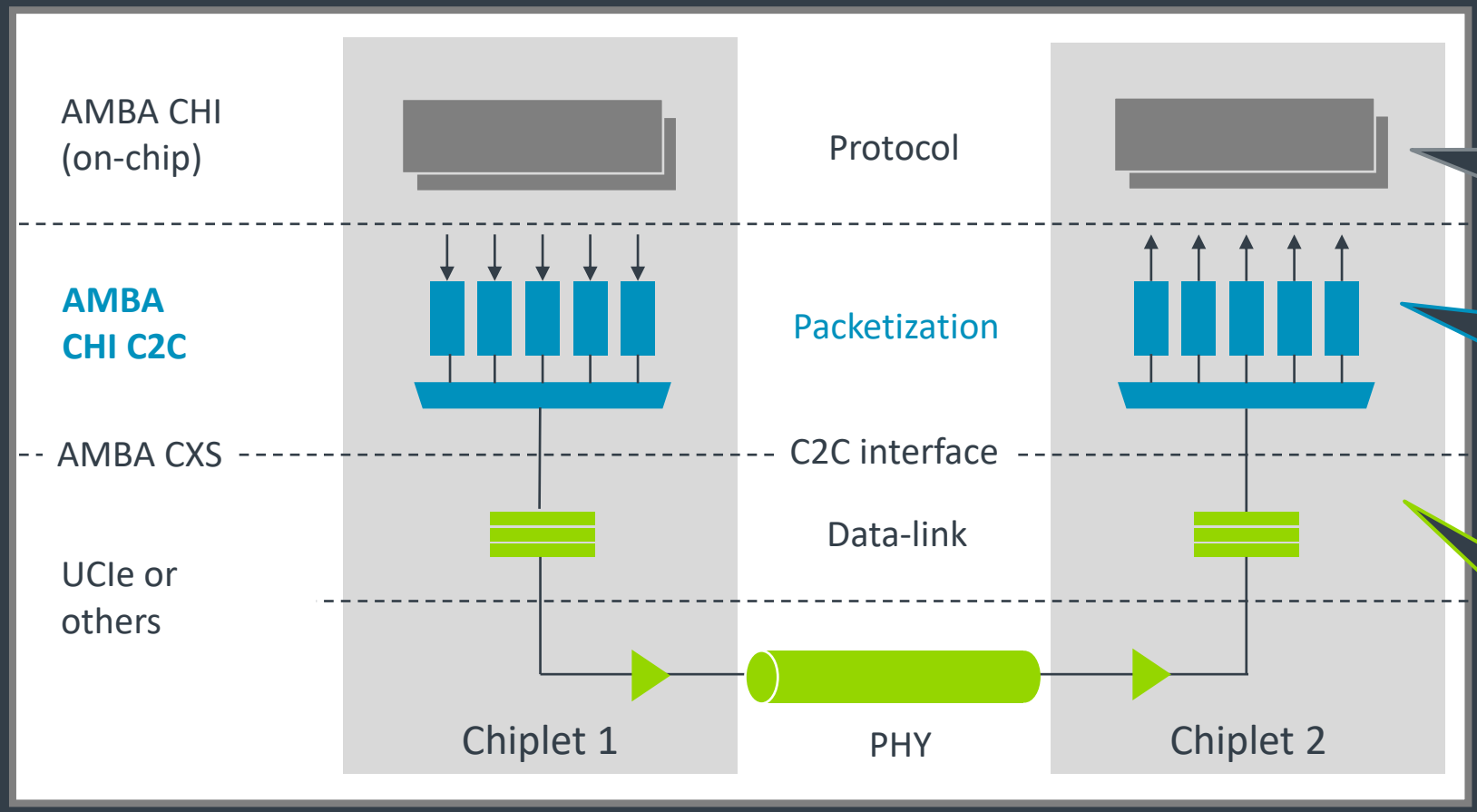


IO Hub



Architecture & Benefits

Clean separation of layers allows use of third-party and industry standard data-link & PHYs



Transporting the same on-chip protocol allows seamless use of architecture features without protocol conversion.

Shared channels increases efficiency.
Simple packing minimizes latency & complexity.

Streaming interface with additional flit formats provides link robustness using UCIe defined data-link CRC & retry.

Introducing Arm Total Design

- New ecosystem committed to frictionless delivery of Arm Neoverse CSS-based SoCs
- Includes industry leaders in semiconductor design & manufacture
- Accelerated deployment of innovative custom silicon
- Will help the development of Arm-based chiplets which will propel the journey towards a chiplet marketplace.

arm TOTAL DESIGN

3rd Party IP	Design Services	Foundry	Firmware
Pre-validated to ensure compatibility	Expertise on CSS designs and methodology	Support on leading edge nodes & 3D technology	Commercial firmware support for Neoverse CSS

In Summary

System Architecture

- The shift from monolithic to multi-die systems creates several partitioning choices.
- Additional system architectures are needed to avoid unnecessary fragmentation that would hinger the development of a multi-vendor Chiplet ecosystem.

AMBA CHI C2C

- Solid foundation & low-risk adoption path.
- Seamless use of architecture features without conversion.
- Optimizations for link utilization & latency.
- Reuse of 3rd party data-link and PHY solutions (e.g. UCIe).
- Initial specification nearing completion & publication.

Collaboration

- Numerous industry calls for standardization.
- Growing momentum and collaboration with partners.
- We look forward to feedback from partners.


Where there’s Arm…
There’s a *community* of innovation.
Get involved:
csa-feedback@arm.com

arm

Thank You
Danke
Gracias
Grazie
谢谢
ありがとう
Asante
Merci
감사합니다
धन्यवाद
Kiitos
شكرًا
ধন্যবাদ
תודה
ధన్యవాదములు