



arm

# Arm Flexible Access for Research

Technical Overview

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# Current Research Enablement Portfolio

- Building blocks

- HW IP - CPUs, Interconnects, other peripherals\*
- Physical IP - Standard cells, Memory compilers, POP IP
- Tools and SW - DS-5, mbed OS, compute library, CMSIS-NN, etc

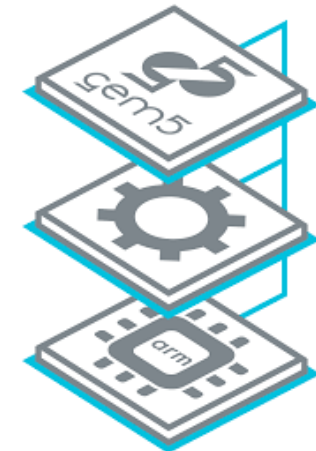
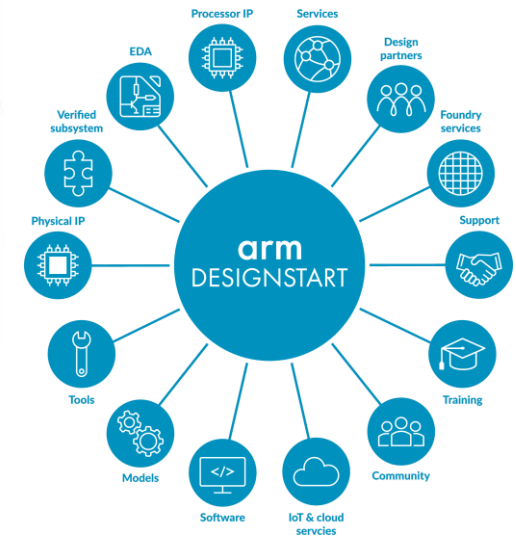


- SoC HW/SW co-development with DesignStart platform

- DesignStart Eval: Cortex M0/ M3 based systems, evaluation with obfuscated RTL
- DesignStart Pro Academic: Cortex M0/ M3 based systems, RTL for SoC design
- DesignStart FPGA: FPGA optimised cores Cortex M1/ M3
- DesignStart FPGA on Cloud: Cortex M33 based system, HW/SW codesign in the cloud

- Compute systems modelling and architecture exploration

- Gem5 - CPU and system modelling
- Fixed Virtual Platforms (FVP) – functional SW prototyping



# New Arm Flexible Access for Research IP portfolio

## Cortex-A High Performance CPUs

Cortex-A5

Cortex-A7

Cortex-A32

Cortex-A34

Cortex-A35

Cortex-A53

All with support for Neon/FPU/ETM

## Cortex-R Real Time CPUs

Cortex-R5

Cortex-R8

Cortex-R52

All with support for Neon/FPU/ETM

## Cortex-M Efficient Embedded CPUs

Cortex-M0

Cortex-M0+

Cortex-M23

Cortex-M3

Cortex-M4

Cortex-M33

Cortex-M7

Support for FPU/ETM/MTB

## Corstone Foundation IP

Corstone-201

## Mali Graphics

MALI-G31

MALI-G52

Support for with Android/Linux DDK

## IP Tools

Socrates IP configuration Tool

## CoreLink Peripherals

CoreLink CCI-550/NIC-450 Interconnect

CoreLink L2C-310 L2 cache controller

CoreLink DMA-330/230 DMA controller

CoreLink GIC-500 Interrupt controller

CoreLink MMU-500 system MMU

CoreLink Peripherals (UART, GPIO etc)

# New Arm Flexible Access for Research IP portfolio

Corstone deliverables

## CorStone 201 Foundation IP

CM0SDK / CMSDK peripherals

AHB Flash Cache

TRNG

RTC

CoreLink SIE-200 System IP

LPD-500 (Low Power Distributor)

CoreLink GFC-100 Flash Controller

CoreLink GFC-200 Flash Controller

PCK-600 Kratos (power control)

SDC-600 Chaucer (authenticated debug)

SSE-050 subsystem (Cortex-M3)

SSE-200 subsystem (Cortex-M33)

Arm Cortex-M0/M0+ Example System



## CMSDK peripherals

AHB2 Bus Matrix, Async, Sync bridges etc.

APB Peripherals

SRAM interfaces etc.



## CoreLink SIE-200 System IP

AHB5 Bus Matrix

AHB5 Bridges Async bridges etc.

TrustZone AHB5 Memory/Peripheral  
Controllers

Pre-verified set of configurable RTL components to ease  
system power and clock management integration.

# New Arm Flexible Access for Research IP portfolio

## CoreSight Debug

CoreSight SoC-400 Debug and Trace

CoreSight SDC-600 Secure Debug Channel

CoreSight STM-500 System Trace Macrocell

CoreSight System Trace Macrocell

CoreSight Trace Memory Controller

## Software Tools

ARM Development Studio

IDE debugger

Streamline performance Analyzer

Arm Complier

Software packs (device drivers, middleware etc.)

Arm Fixed Virtual Platforms

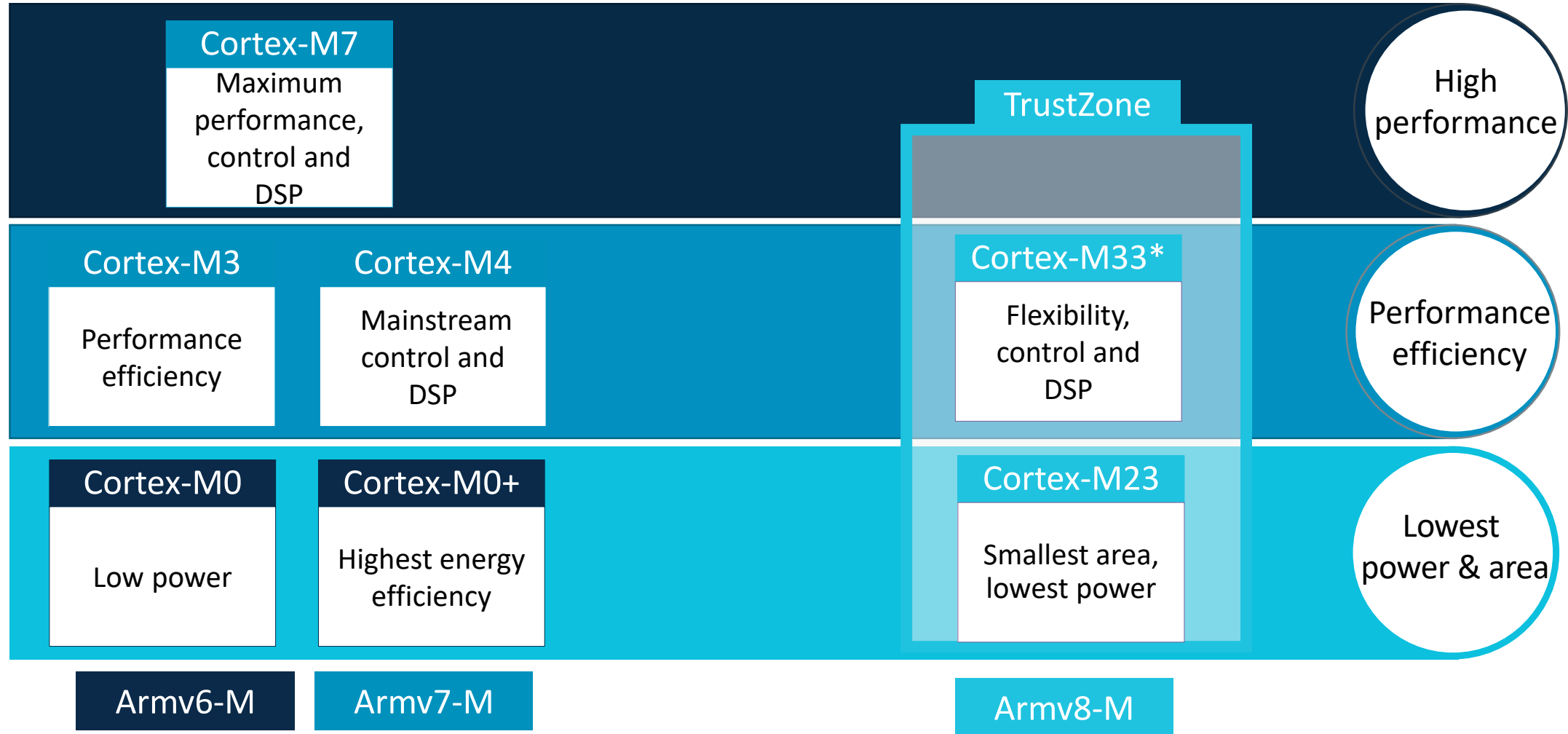
Arm Cycle Models

Arm Fast Models

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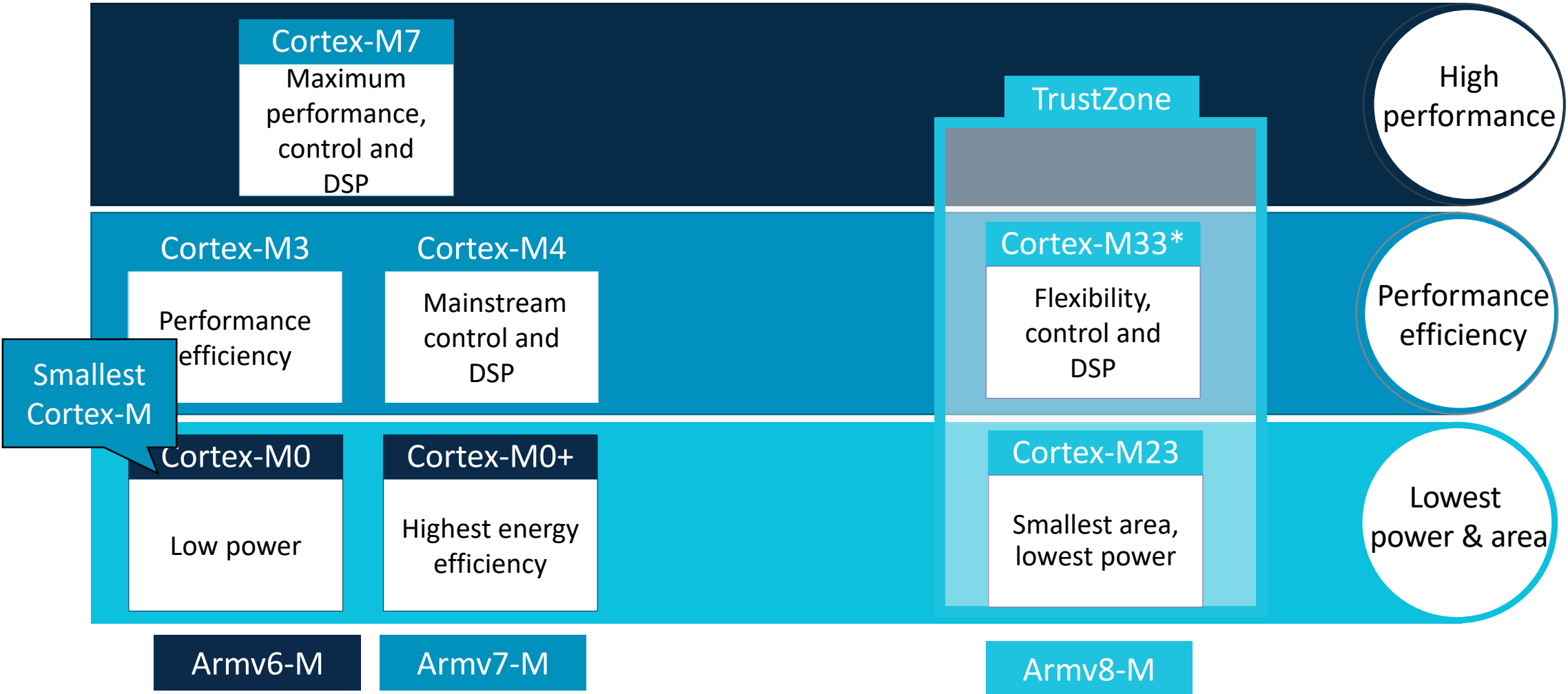
# Cortex-M Overview

# Cortex-M academic offering summary



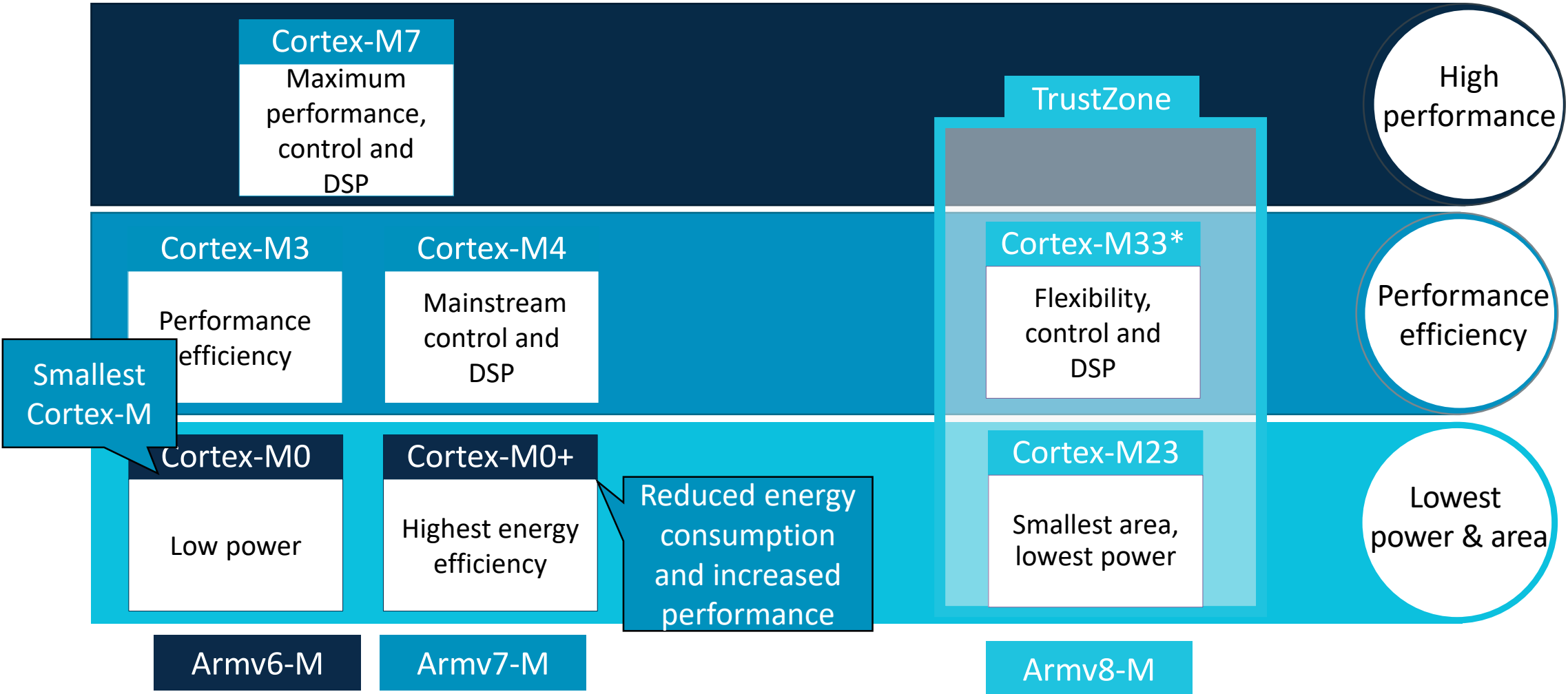


# Cortex-M academic offering summary

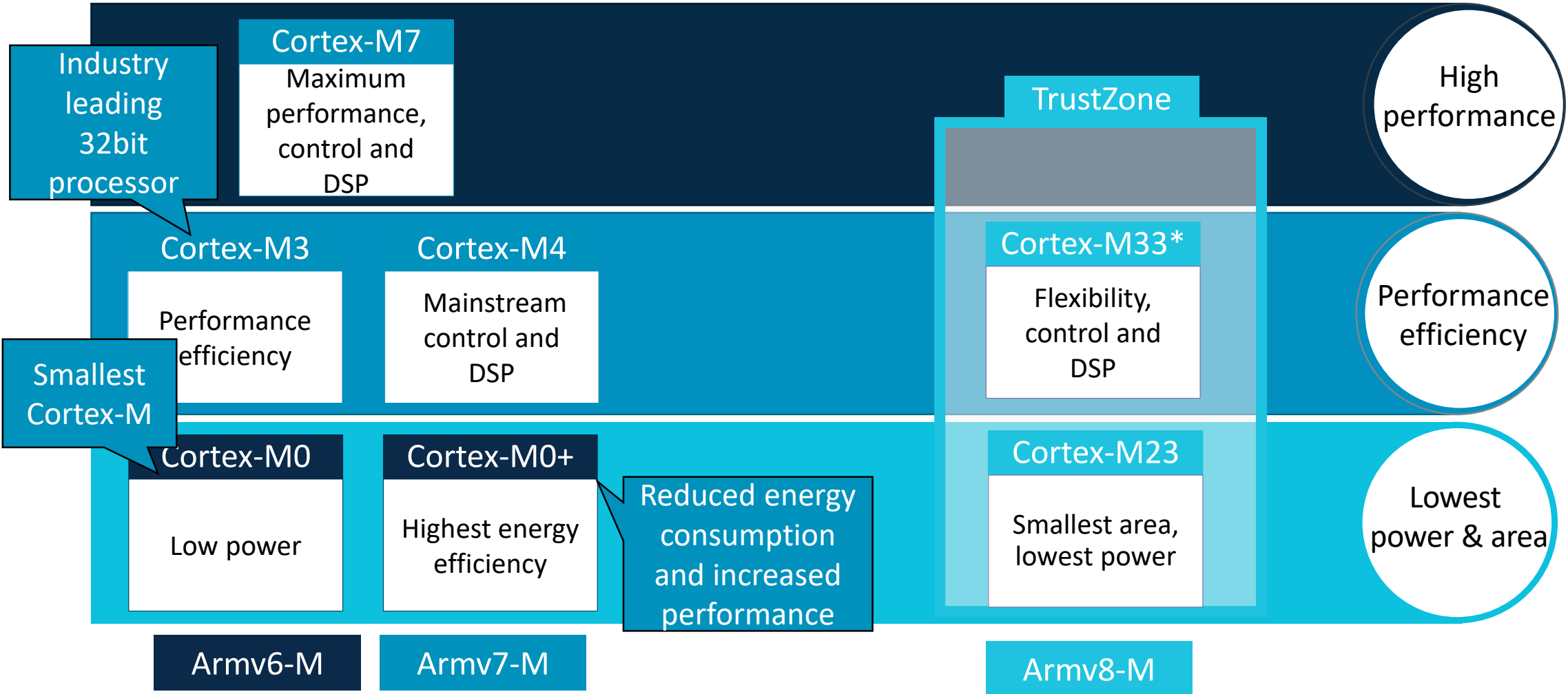




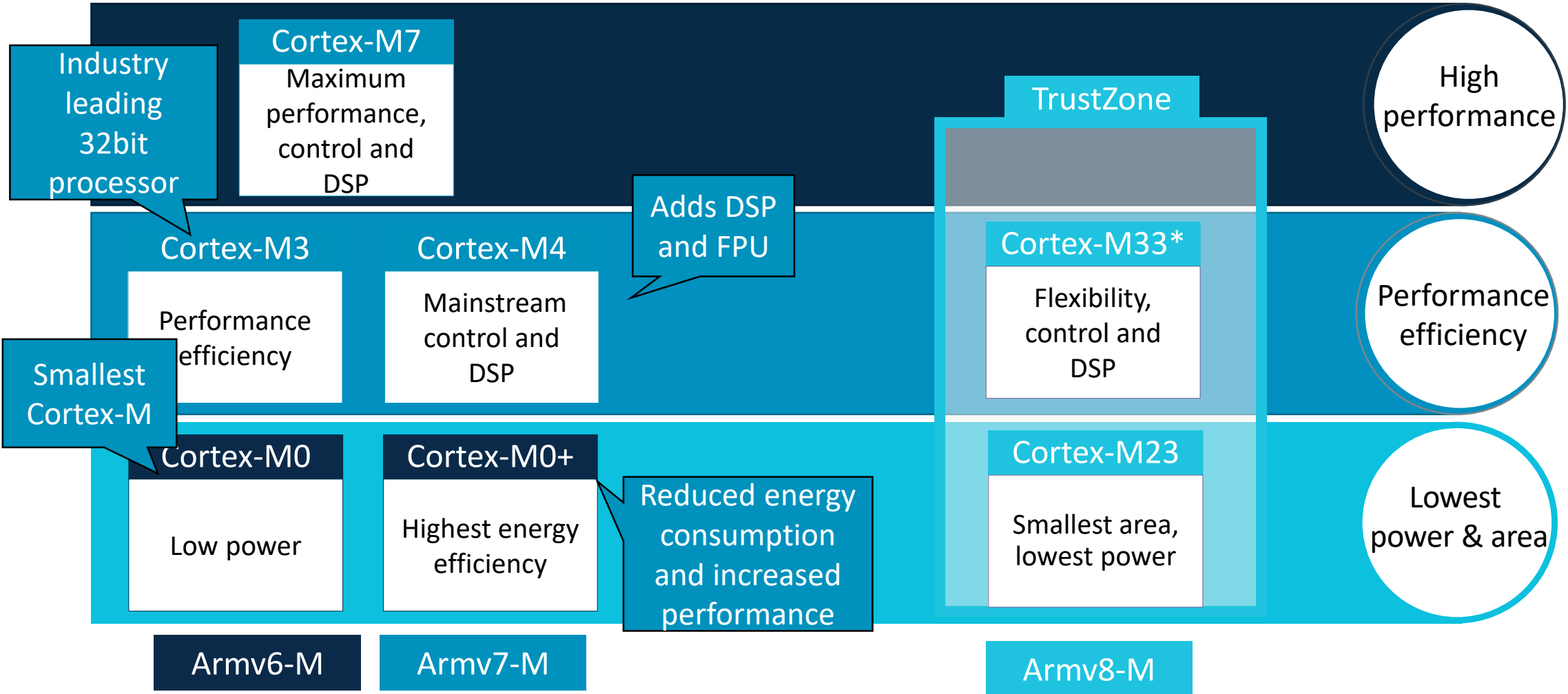
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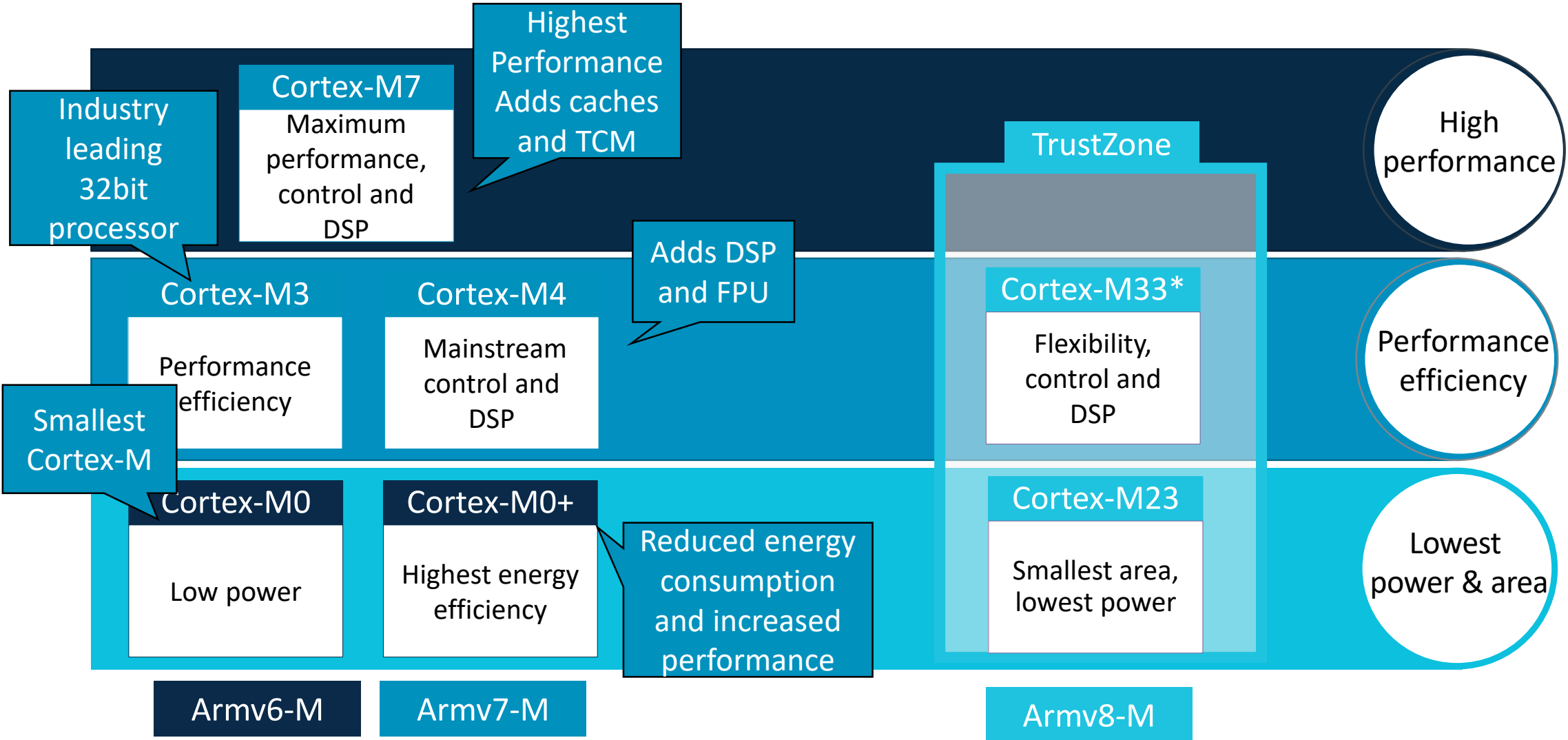
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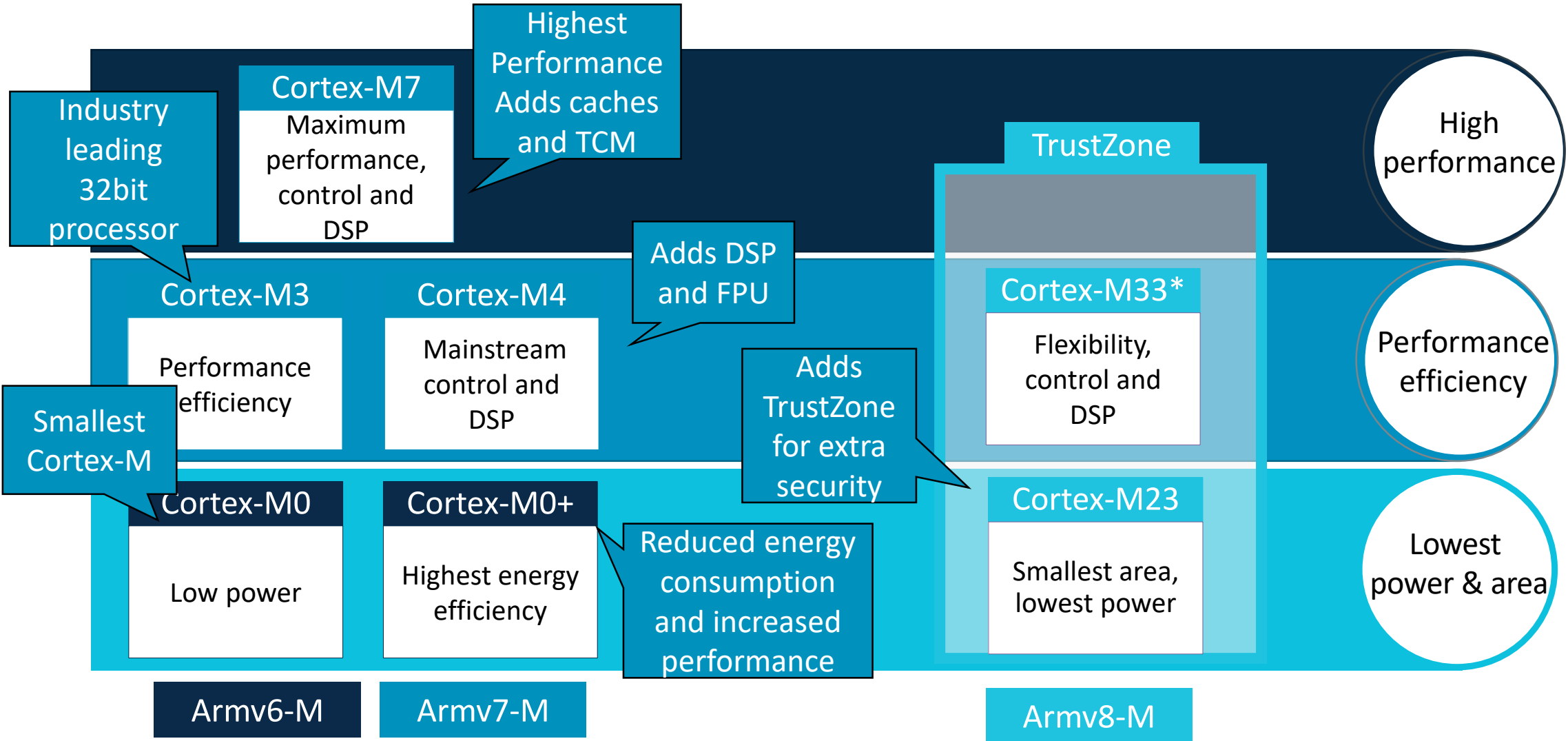
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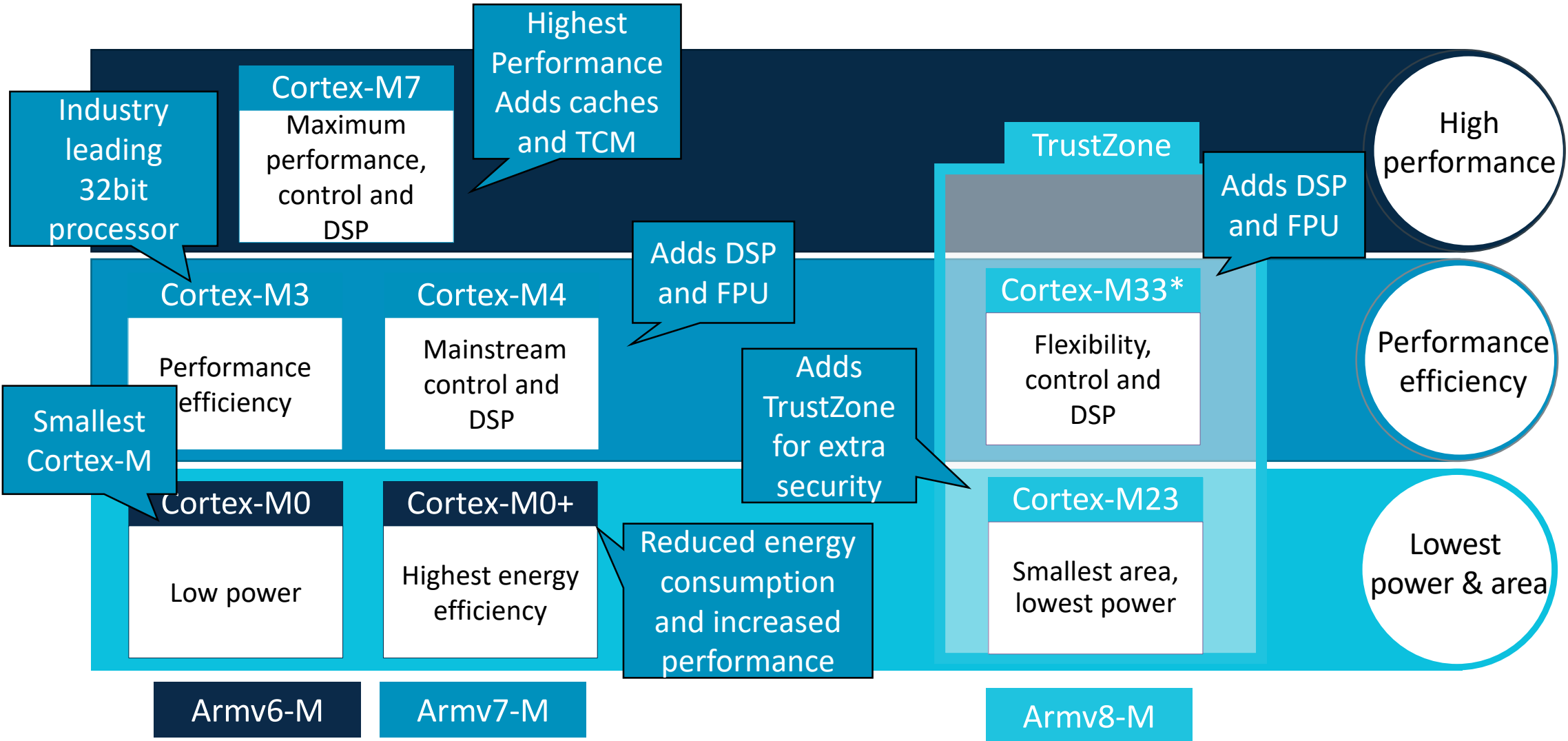
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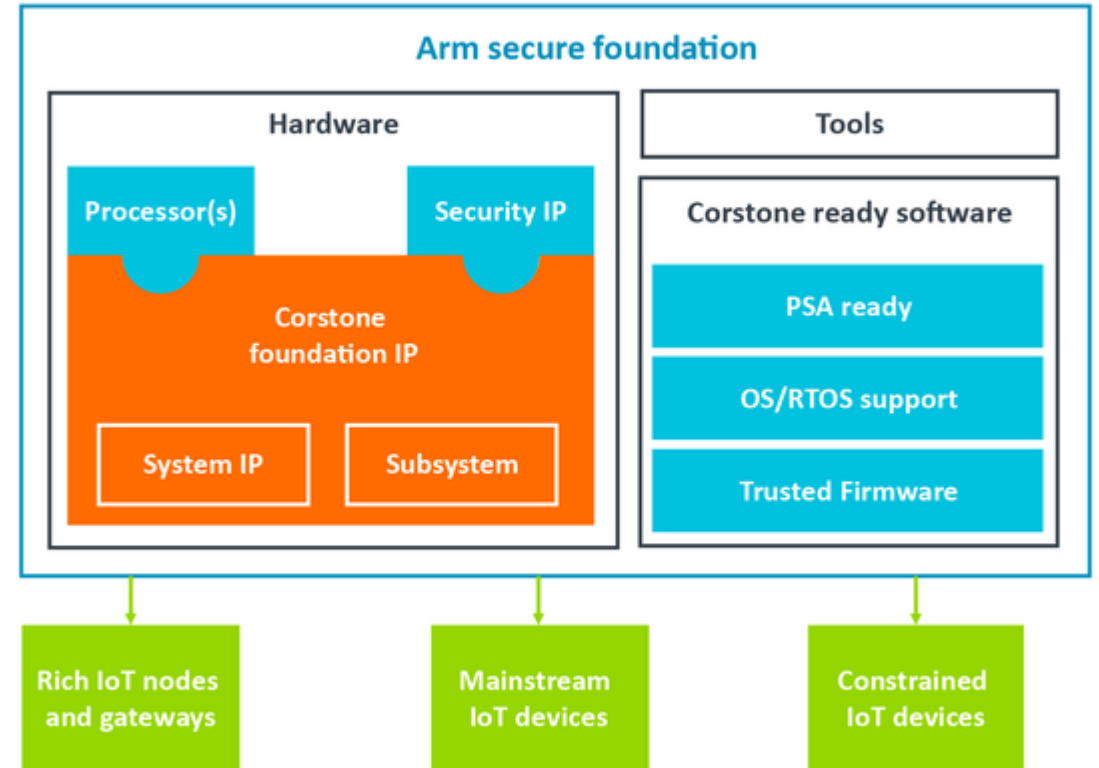


# Cortex-M academic offering summary



# Corstone Foundation IP & Cortex-M SDK

- Designing a System on Chip (SoC) can be a time-consuming complex process.
- Arm offers pre-verified subsystems which can be modified and built upon
- Don't redesign the wheel, reuse existing IP and subsystems to get you to your end goal faster
- Subsystems available for Cortex-M0, Cortex-M3/M4 through to Cortex-M33

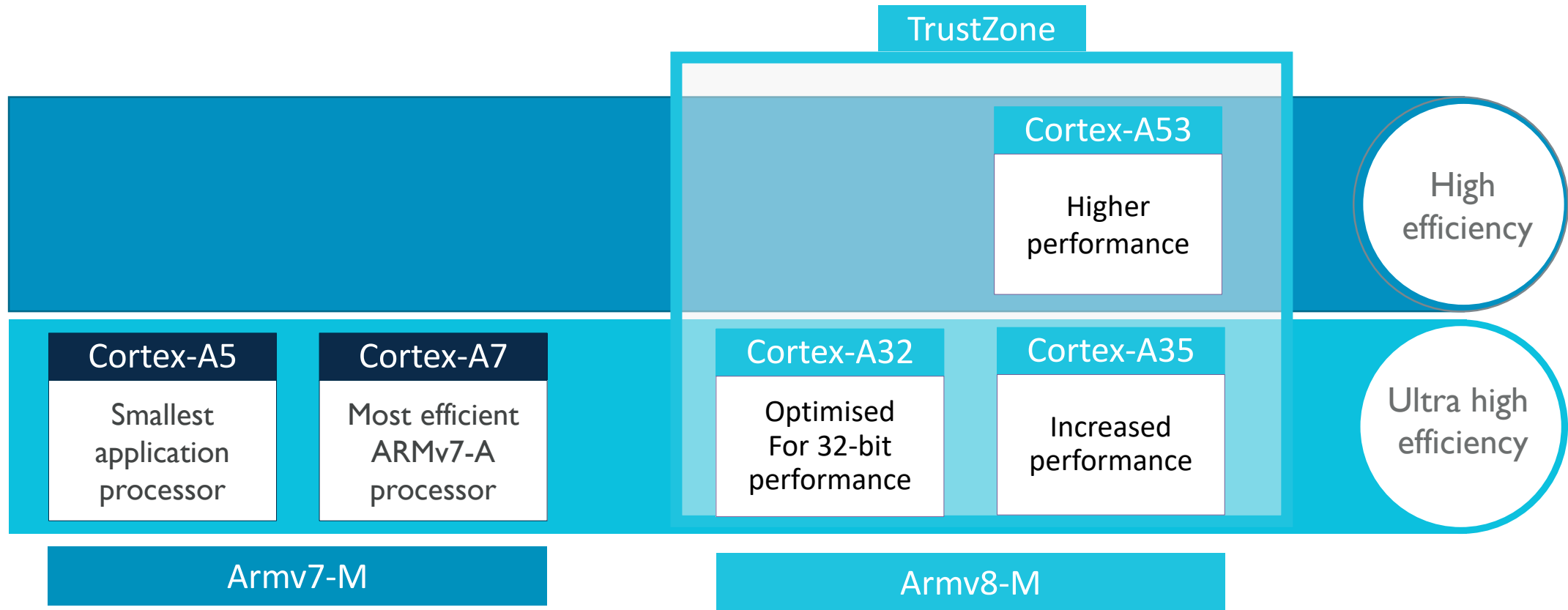




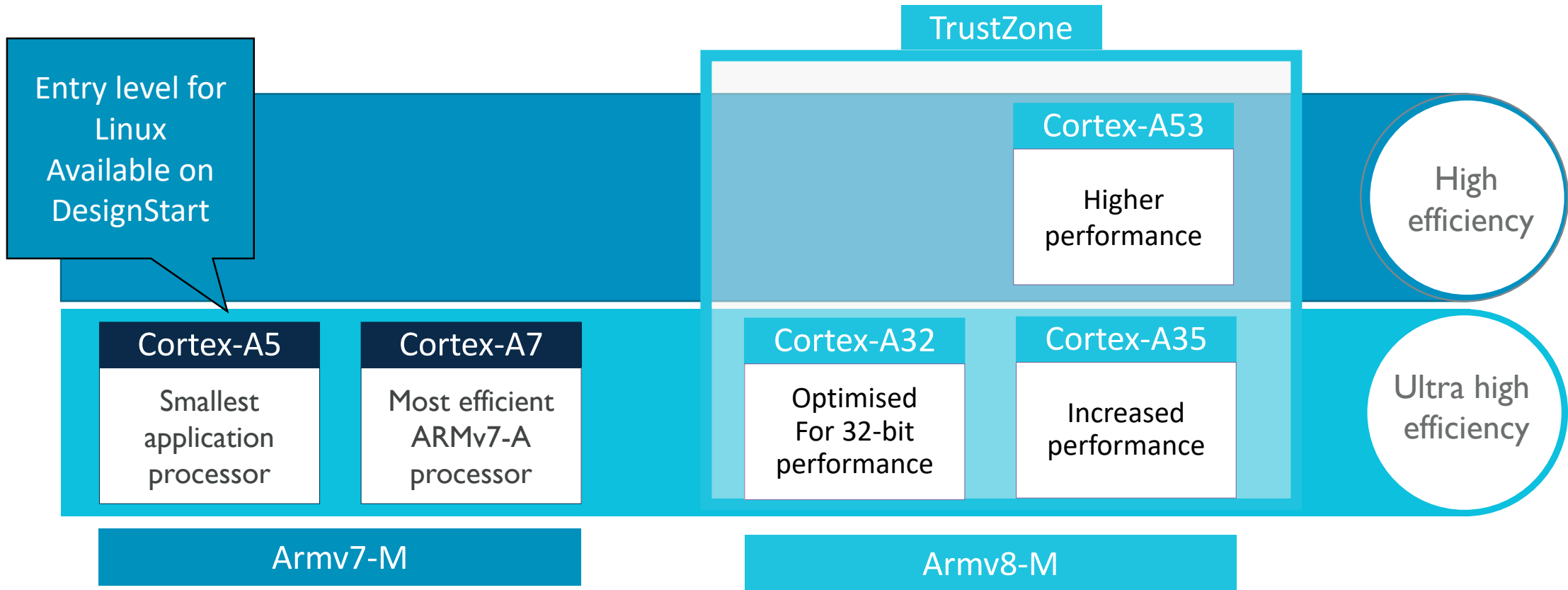
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# Cortex-A CPU Overview

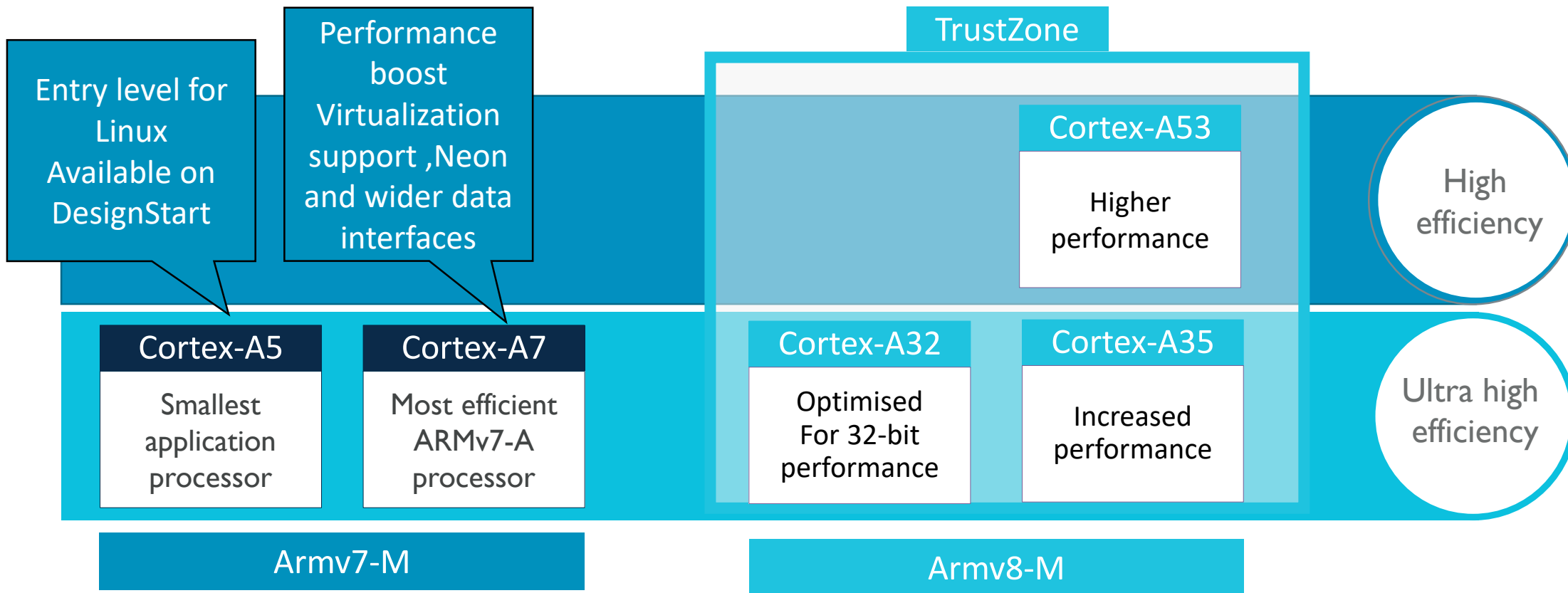
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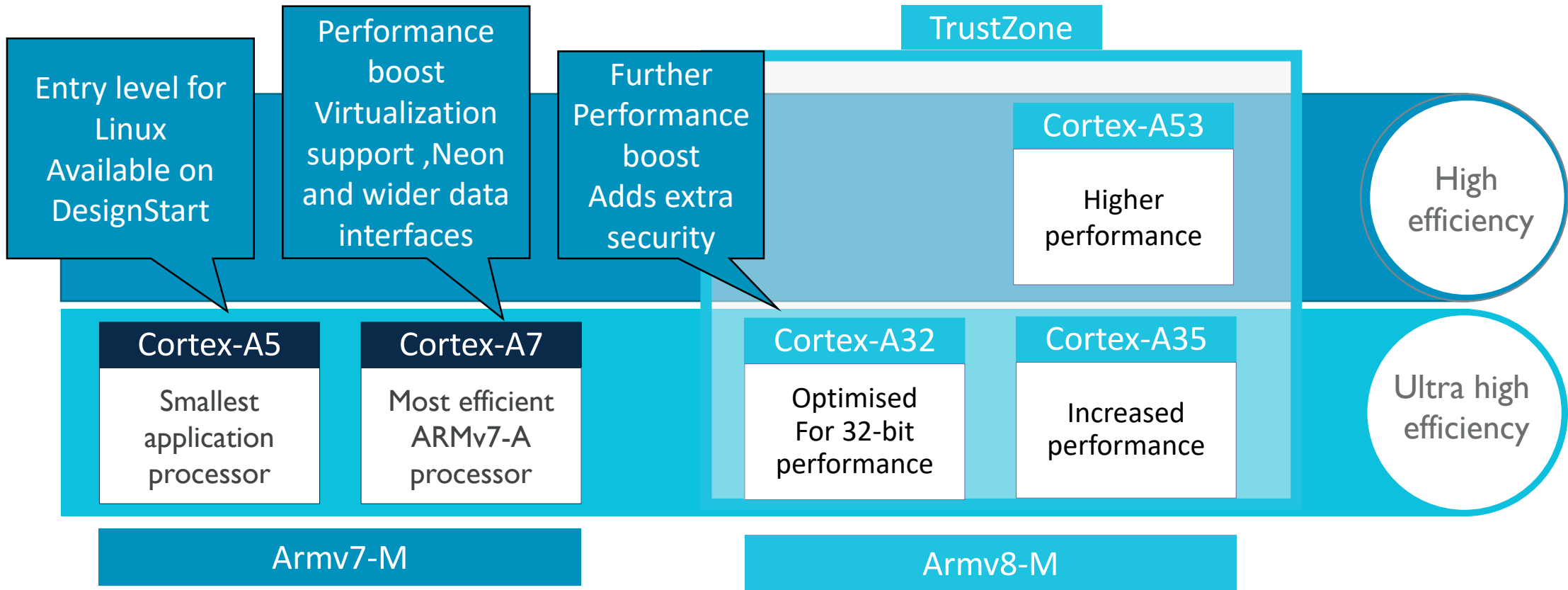
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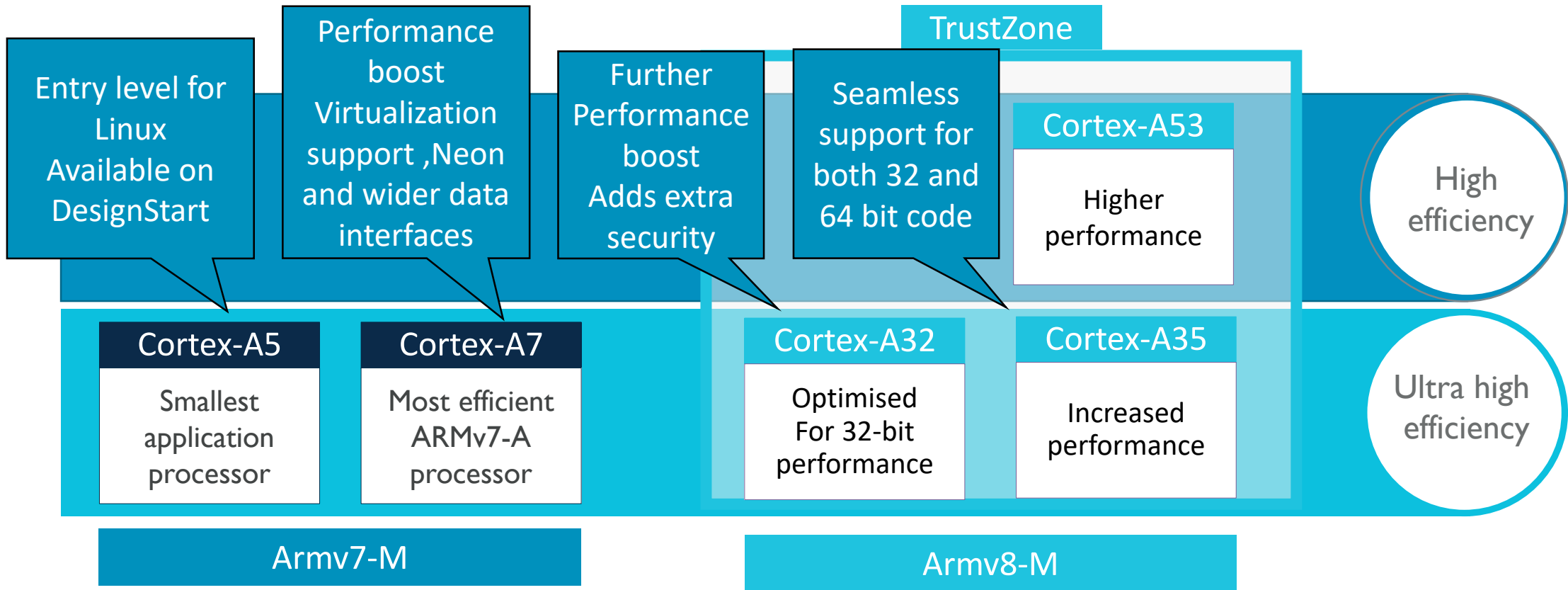
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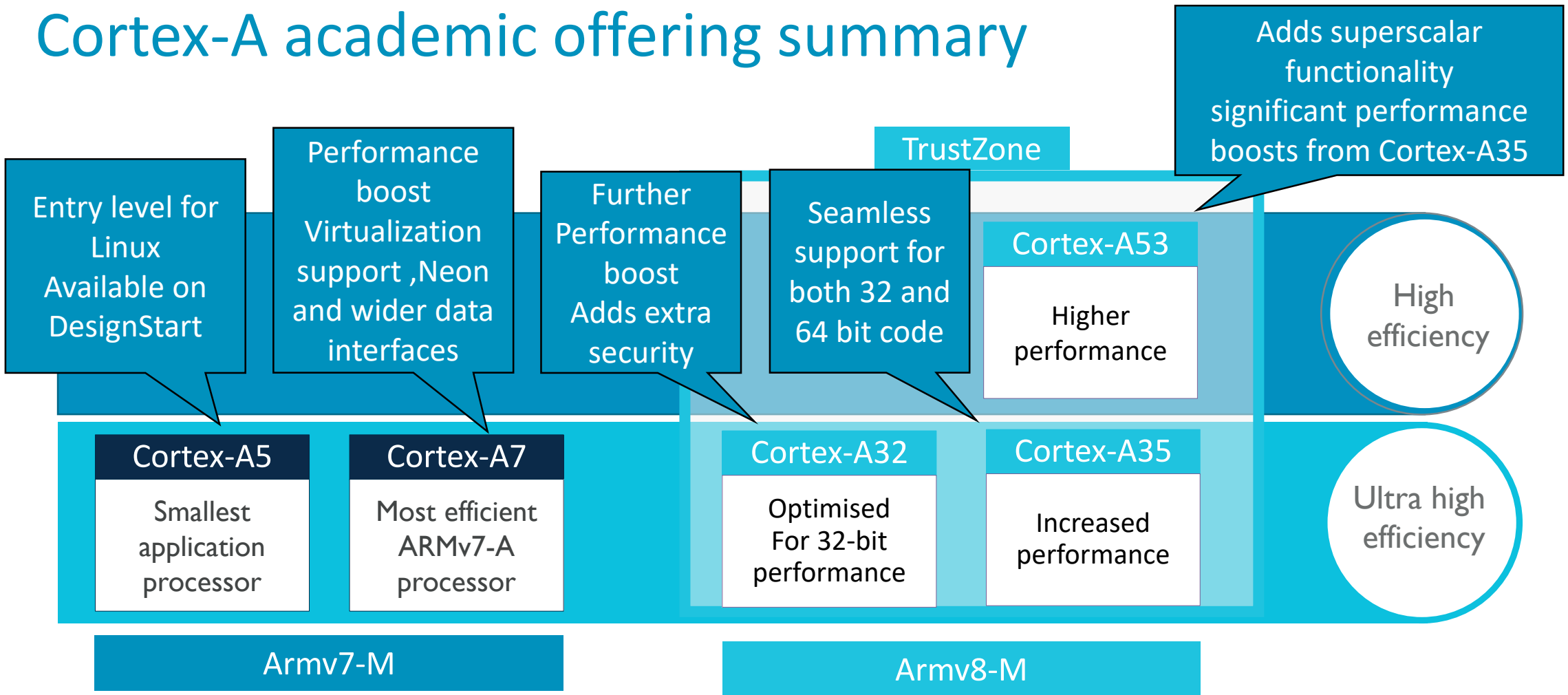
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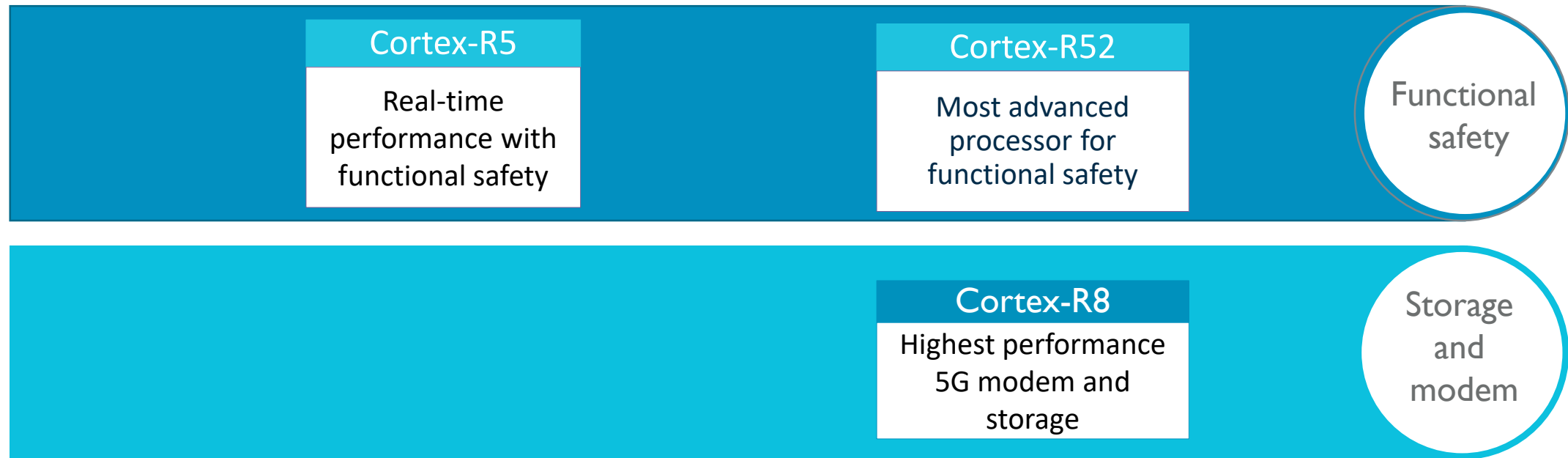




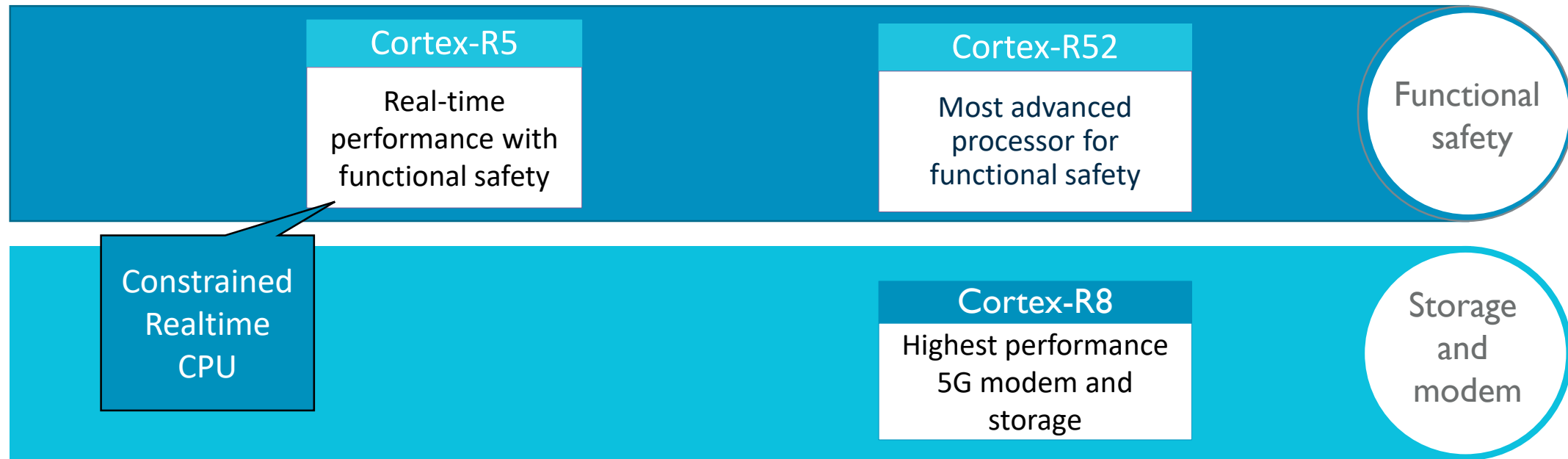
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# Cortex-R CPU Overview

# Arm Cortex-R academic offering summary

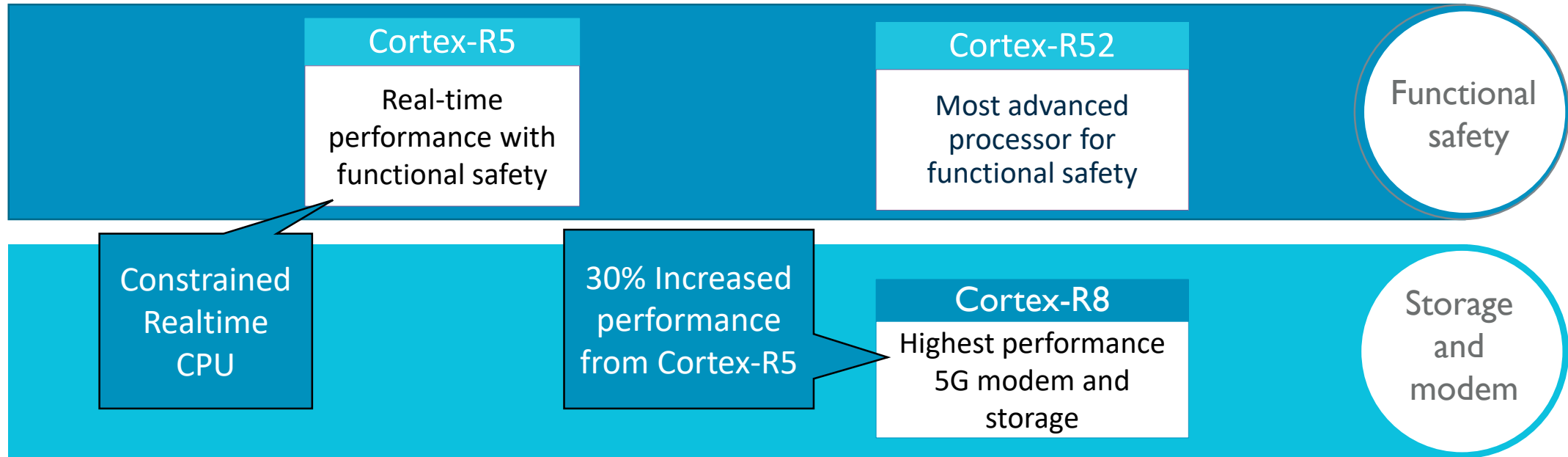


# Arm Cortex-R academic offering summary



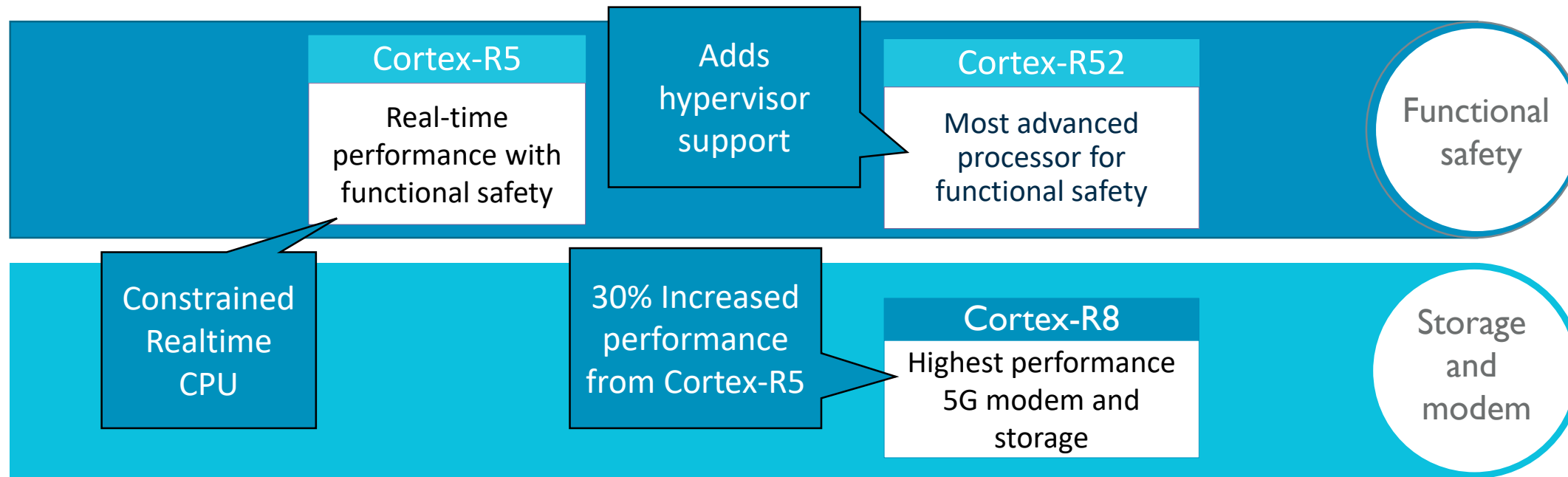
Legend: Armv7-R    Armv8-R

# Arm Cortex-R academic offering summary



Legend: Armv7-R    Armv8-R

# Arm Cortex-R academic offering summary



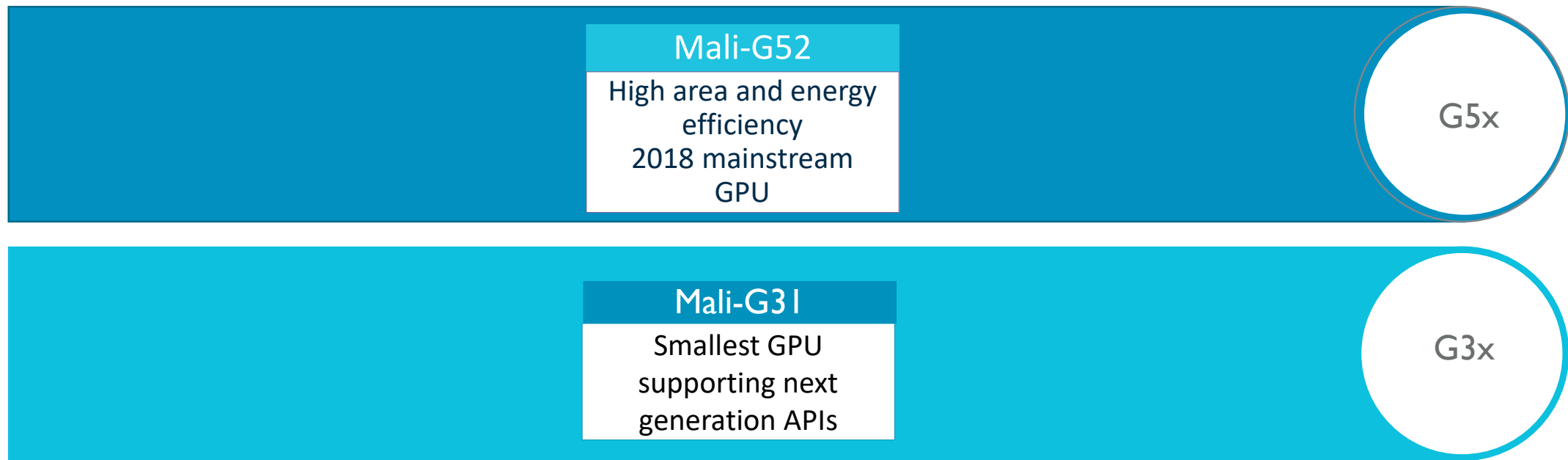
Legend: Armv7-R Armv8-R

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# Mali Graphics Overview

# Arm Mali GPU academic offering summary

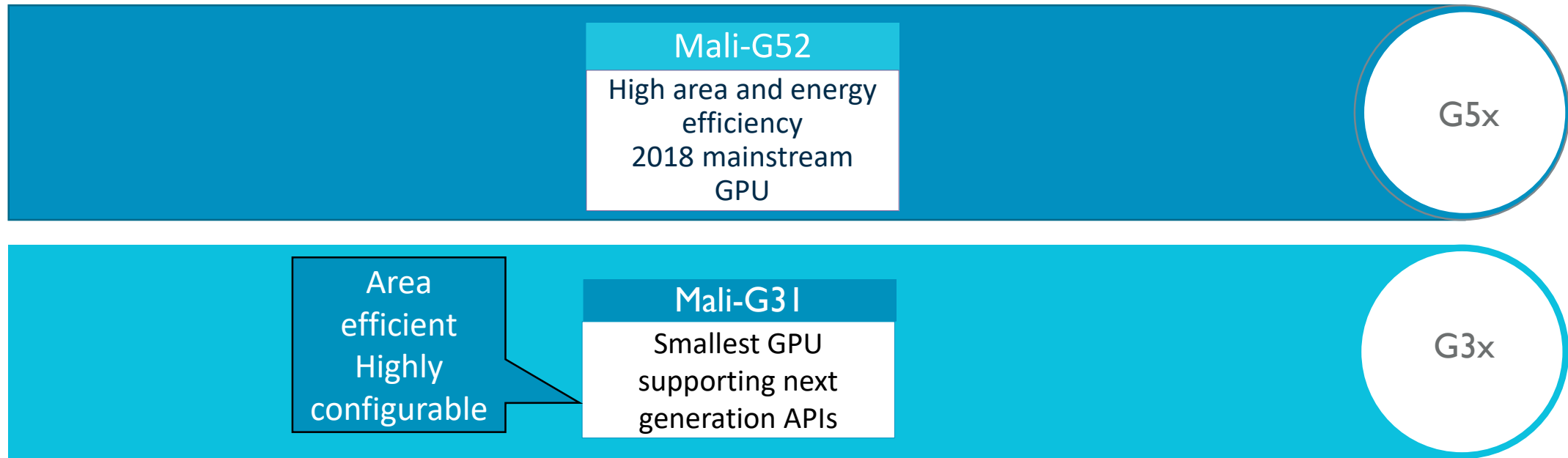
## Bifrost Architecture GPUs





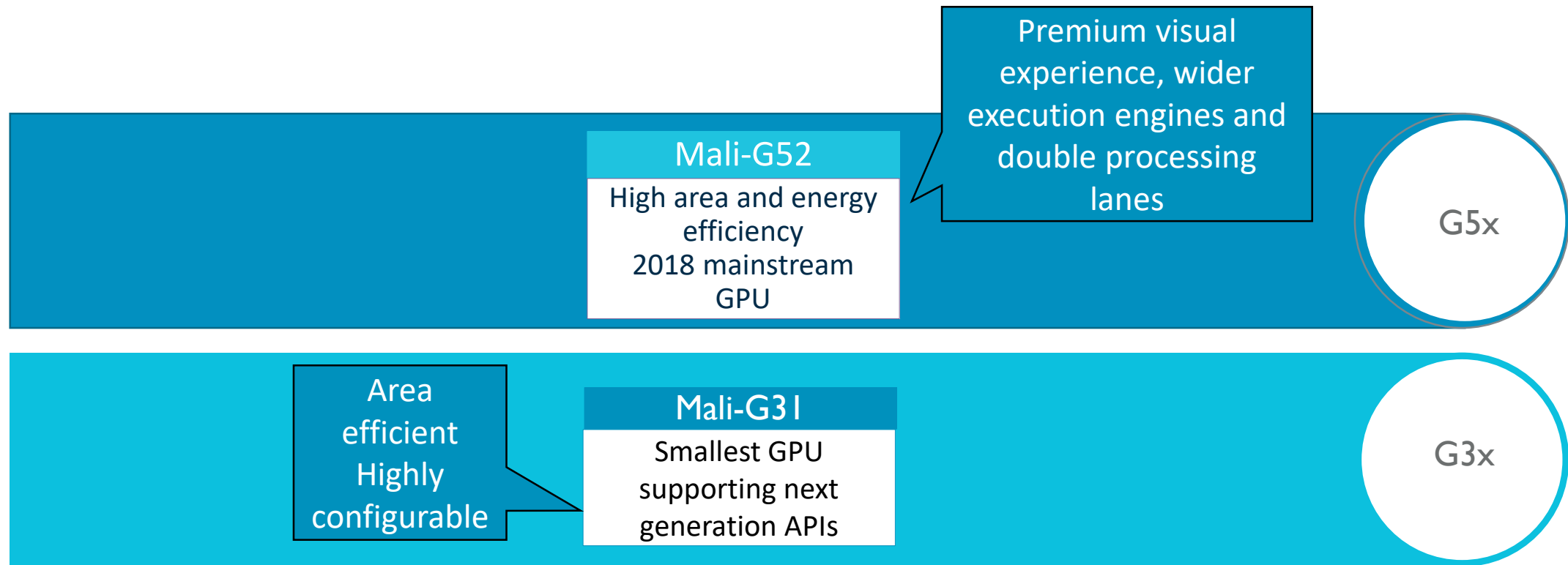
# Arm Mali GPU academic offering summary

## Bifrost Architecture GPUs



# Arm Mali GPU academic offering summary

## Bifrost Architecture GPUs

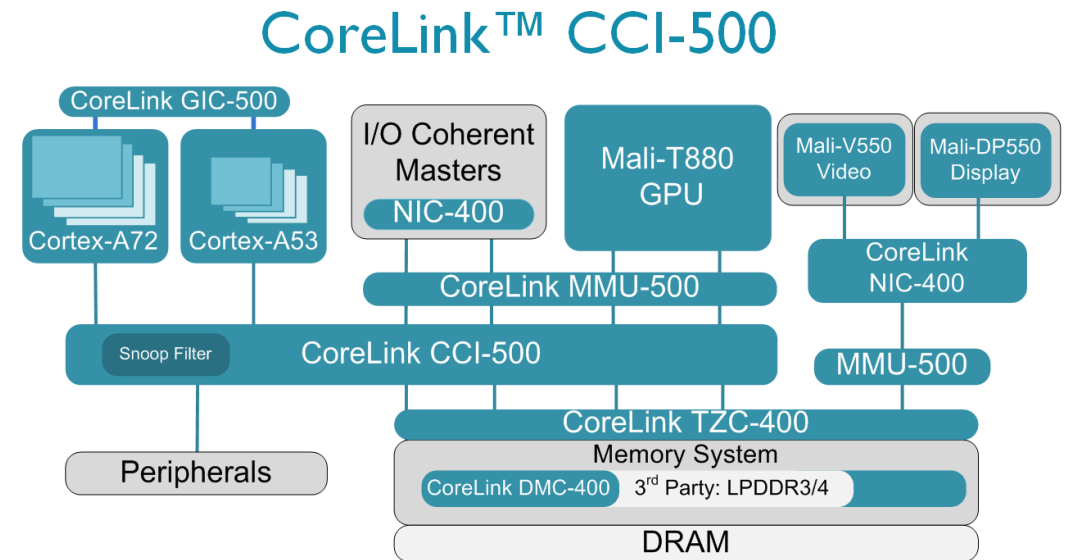


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# CoreLink Interconnect and Socrates IP tooling

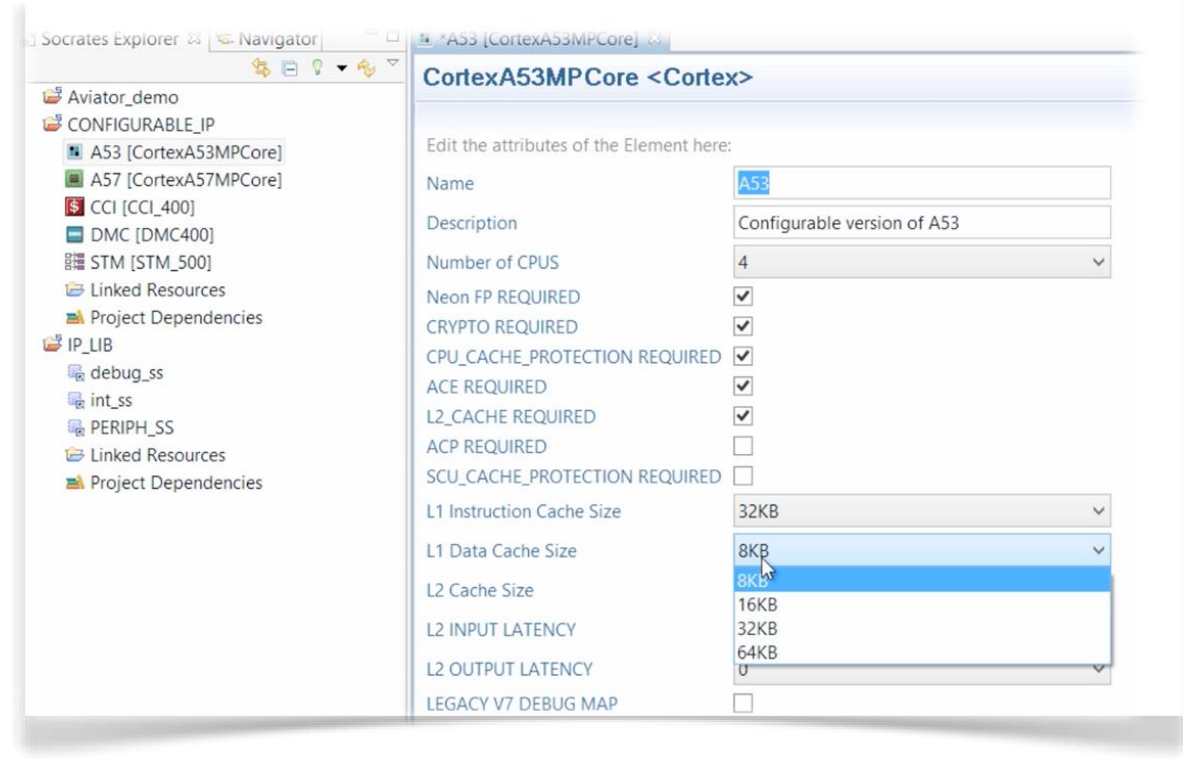
# CoreLink Interconnect

- Arm CoreLink Interconnect provides the components and the methodology for designers to build SoCs based on the latest Arm AMBA specifications
- Fully configurable for SoC connectivity across all applications
- Family covers Cache coherency for big.LITTLE processing to smaller single processor designs



# Socrates IP Configuration Tool

- Arm Socrates is a tool that guides you through the selection, configuration and creation of Arm IP, to achieve integration ready IP in hours instead of days
- Contains a catalog of Arm IP to aid in IP discovery and selection, along with identification of exactly what you need to download from Arm to use the IP
- Design and verify complex interconnect quickly

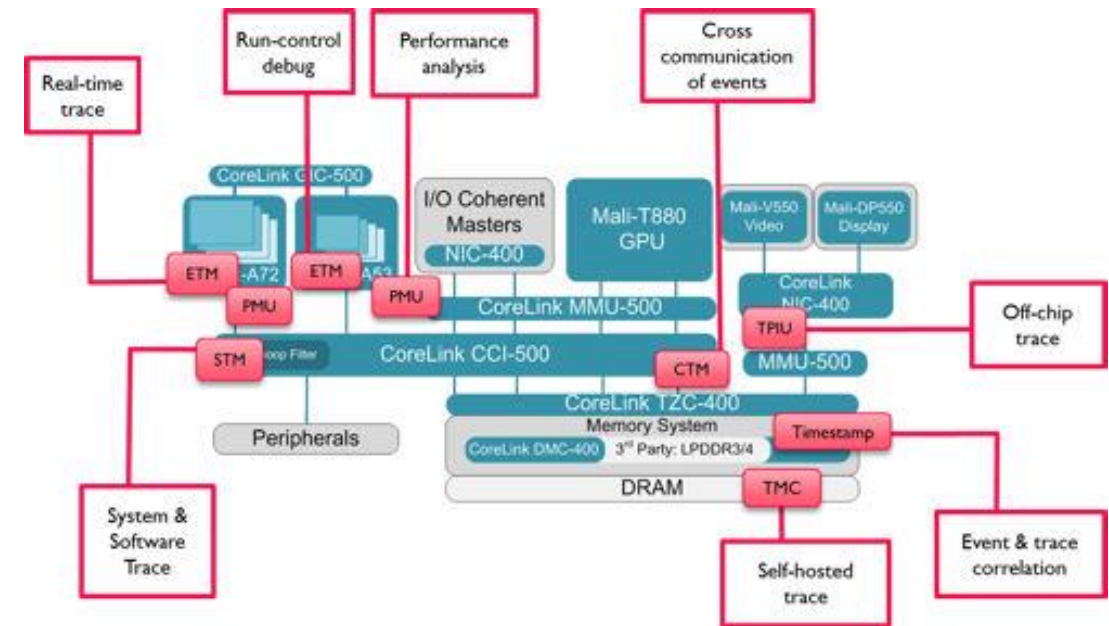


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# CoreSight Debug and Trace

# CoreSight Debug and Trace

- CoreSight technology can be used to debug and trace software that runs on Arm-based SoCs
- Fully supported by Arm Development Studio for the bring-up and optimization of SoCs
- Includes cross trigger and time-stamping distribution capabilities, as well as embedded logic analysis and system trace



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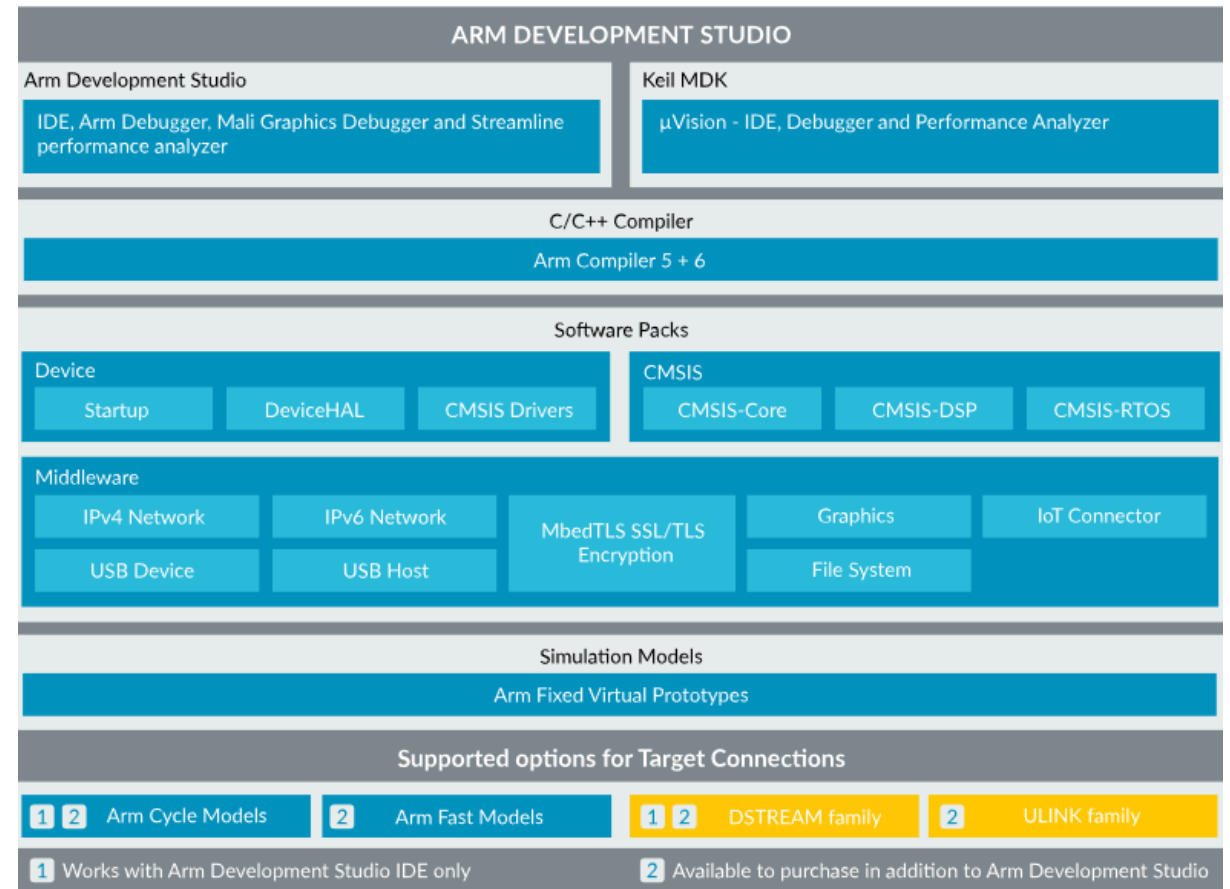
Development Studio



# Arm Development Studio includes

One tool. Any Arm-based project.

- Arm debugger and Keil  $\mu$ Vision debugger
- Embedded C/C++ Arm Compiler 6 including backwards compatible license
- Streamline performance analyzer for system-wide optimization on Linux, Android or bare-metal
- CMSIS-compliant middleware blocks for MCUs
- Armv7 and Armv8 Fixed Virtual Platforms for software development without a hardware target.
- Graphics debugger compatible with OpenGL ES, Vulkan and OpenCL



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Training and support

# Arm online training

- Access to arm online training material
  - Introduction to Arm
  - Introductions to Arm M,A & R Architectures
  - Introduction to TrustZone, DynamicIQ, AMBA
  - Socrates – IP configuration tool
  - More to follow...
  - Wealth of information available on [developer.arm.com](https://developer.arm.com) and [Research Enablement](#) pages
  - Subscribe to Arm's [YouTube](#) channel for useful intros and demos



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Thank You

Danke

Merci

谢谢

ありがとう

Gracias

Kiitos

감사합니다

धन्यवाद

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