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Unlocking Custom Silicon Through Chiplet Standards Ecosystem

SOS27

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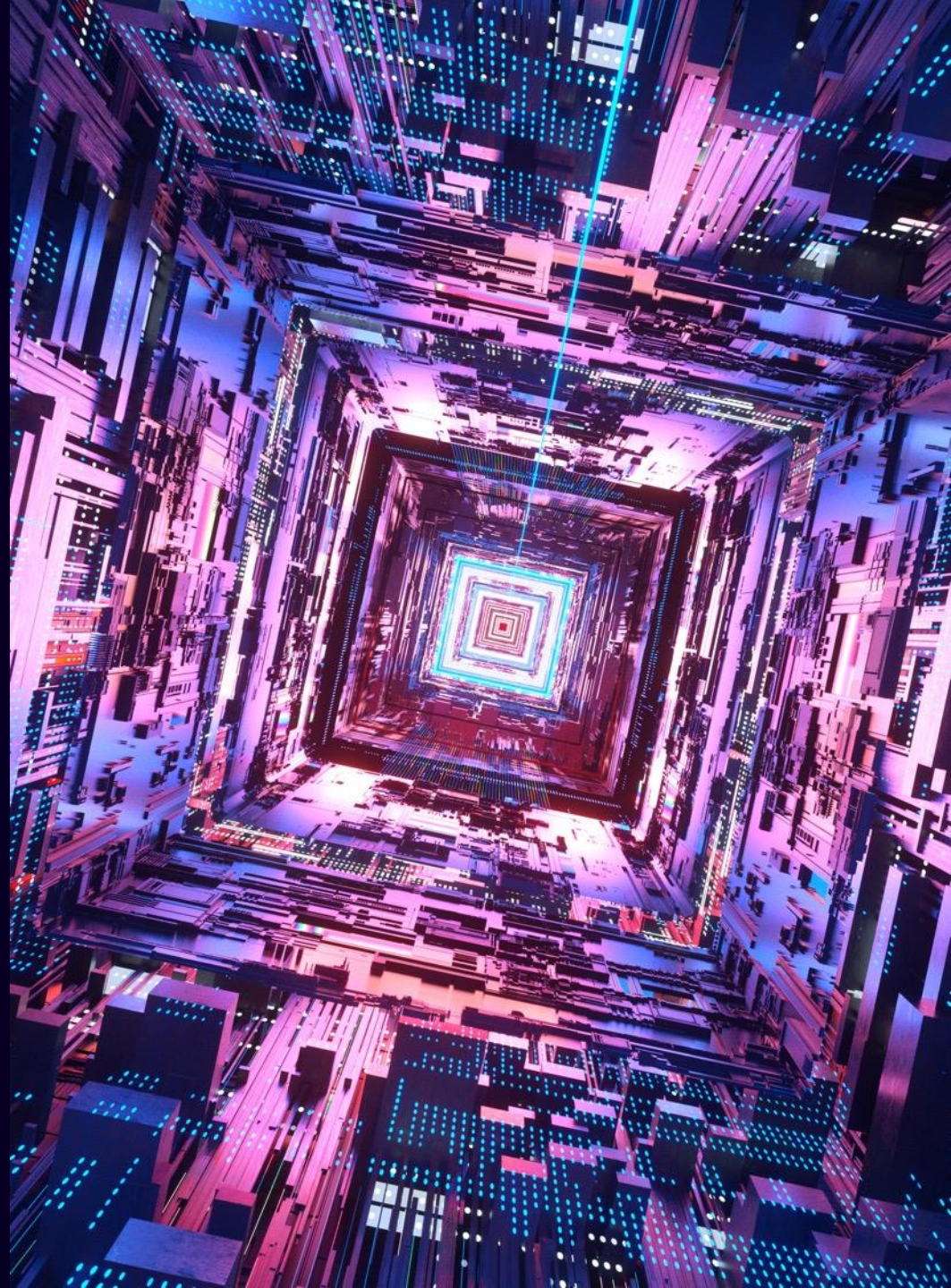
Unique Pressures are Facing the Industry

Time to Market Demands
Design talent is needed, alongside the need for performance and validation

Advanced Node Cost
Costs continue to rise

Need for Specialized Silicon
Moore's Law is slowing down, data concerns are growing, and sustainability is increasingly important



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Chiplets Offer New Opportunity

Lower design costs, higher yield, fewer defects, and better scalability

Customization, flexibility, composability, and faster design turn-around time

…requires standardization

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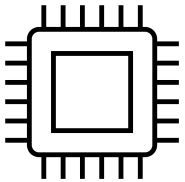
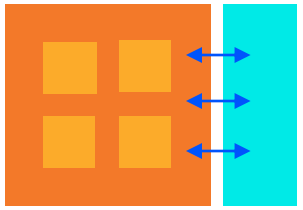
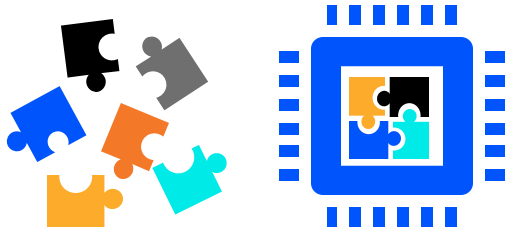
Changing the approach to system design





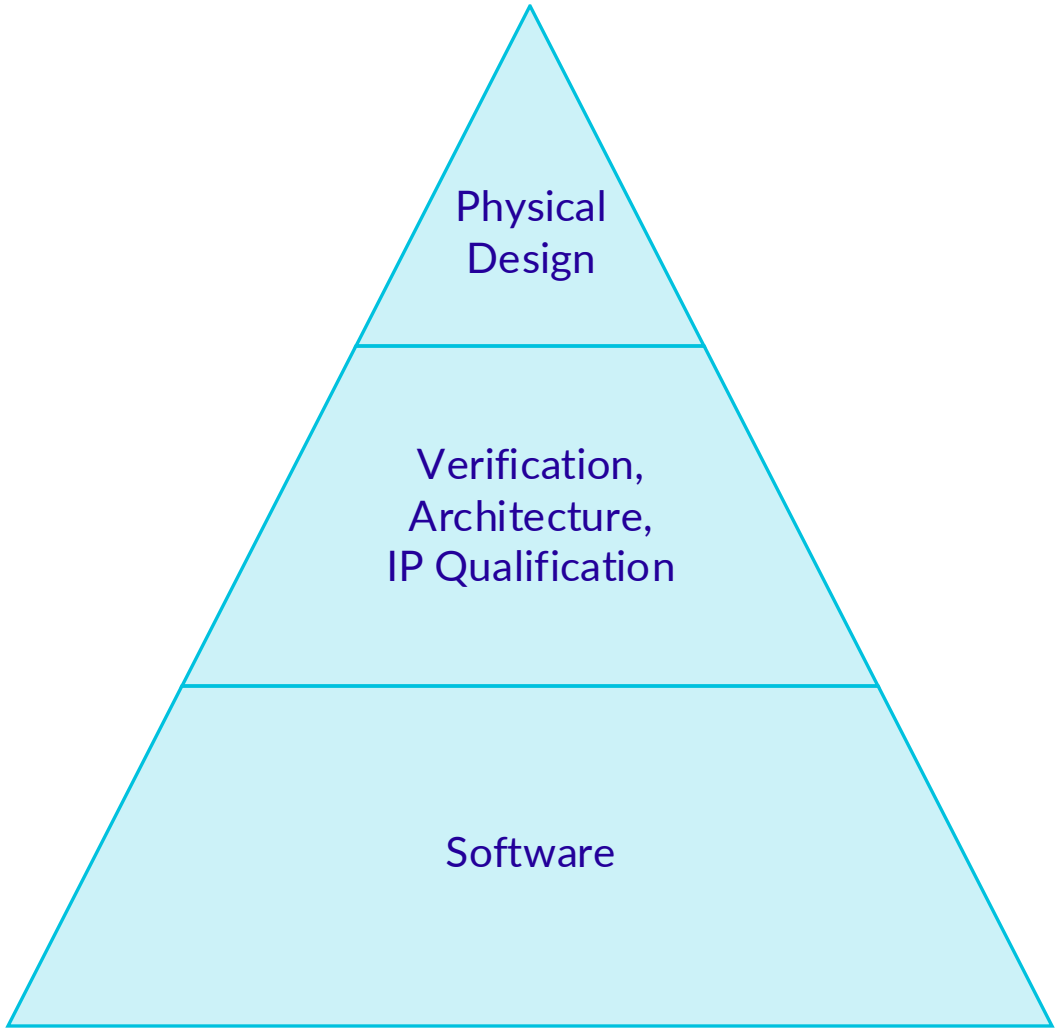


Prior: Off-shelf silicon
Limited set of options to do acceleration on PCB or in system

Today: Custom SoC's using IP that integrates acceleration chiplets

Beyond: Ecosystem of interoperable and reusable chiplets

Reality Check: The Costs of Custom Silicon

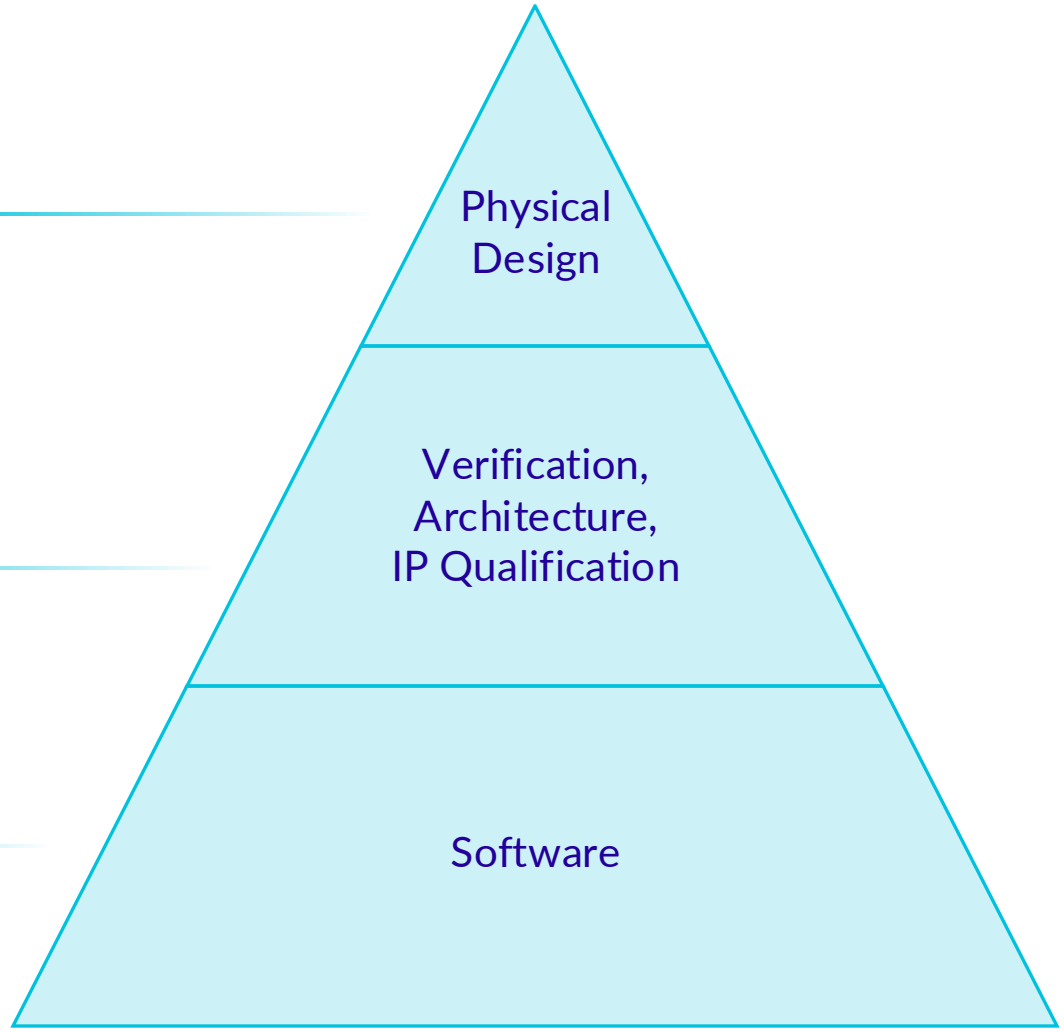


Chiplet Standards Depend on a Strong Foundation

- Collaboration around chiplet standards
- Aligned with Arm Compute Subsystems (CSS)
- Software does not change!

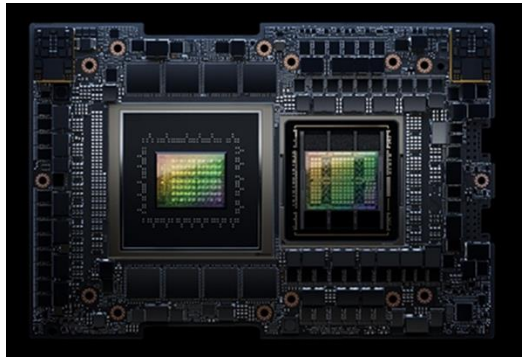
- Licensable IP components
- Arm Total Design ecosystem

- Strongly curated CPU architecture
- System architecture (SystemReady)



Leading Cloud & AI SoCs Use Chiplets Today

NVIDIA Grace Hopper



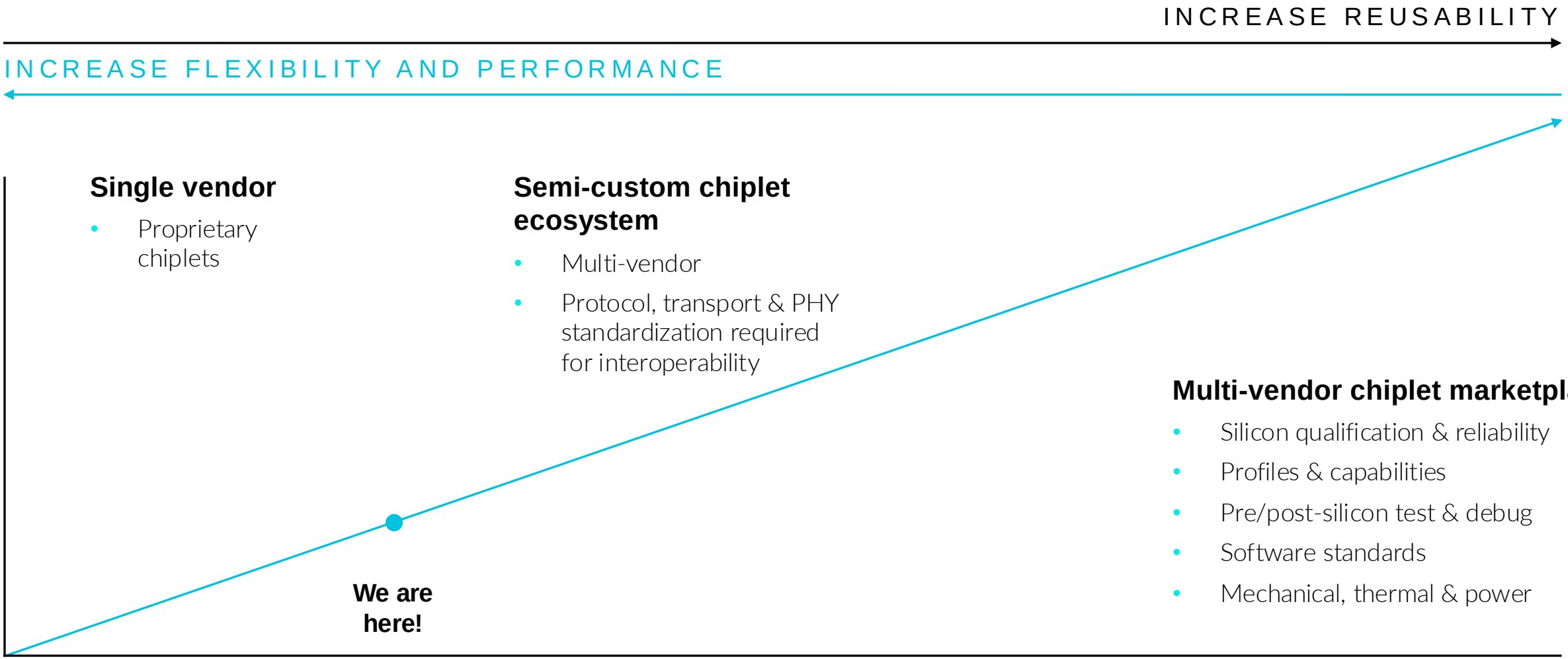
Grace CPU + Hopper GPU

AWS Graviton 4

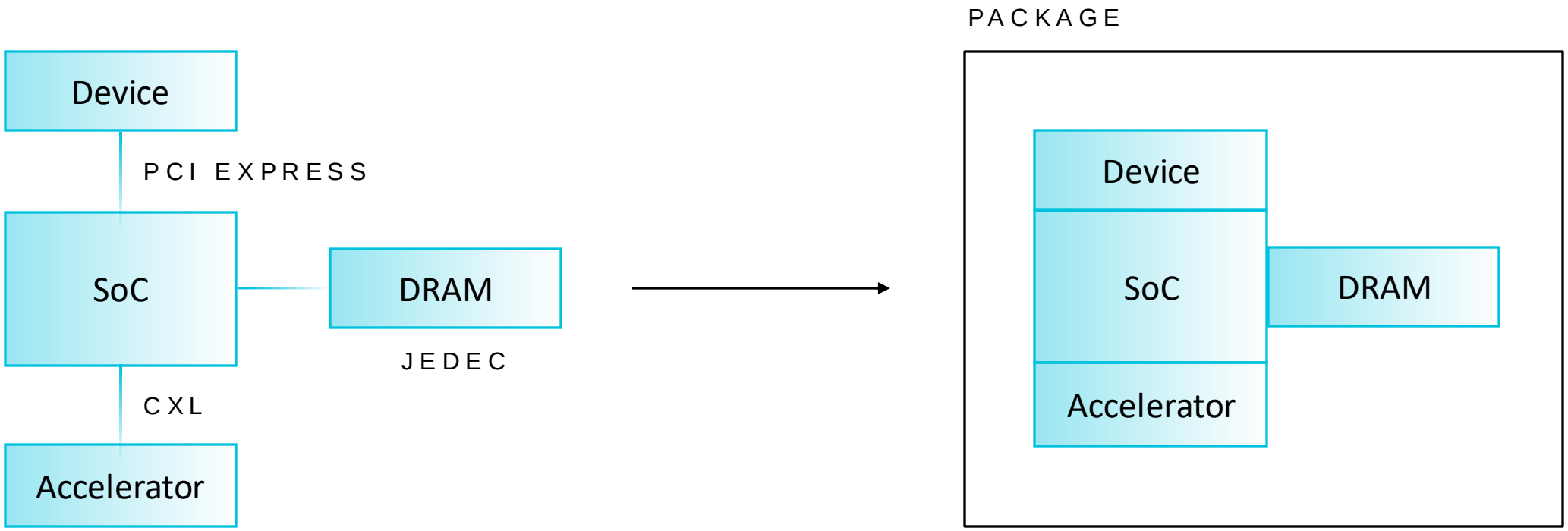
CPU + I/O

CPU Powered by Arm Neoverse

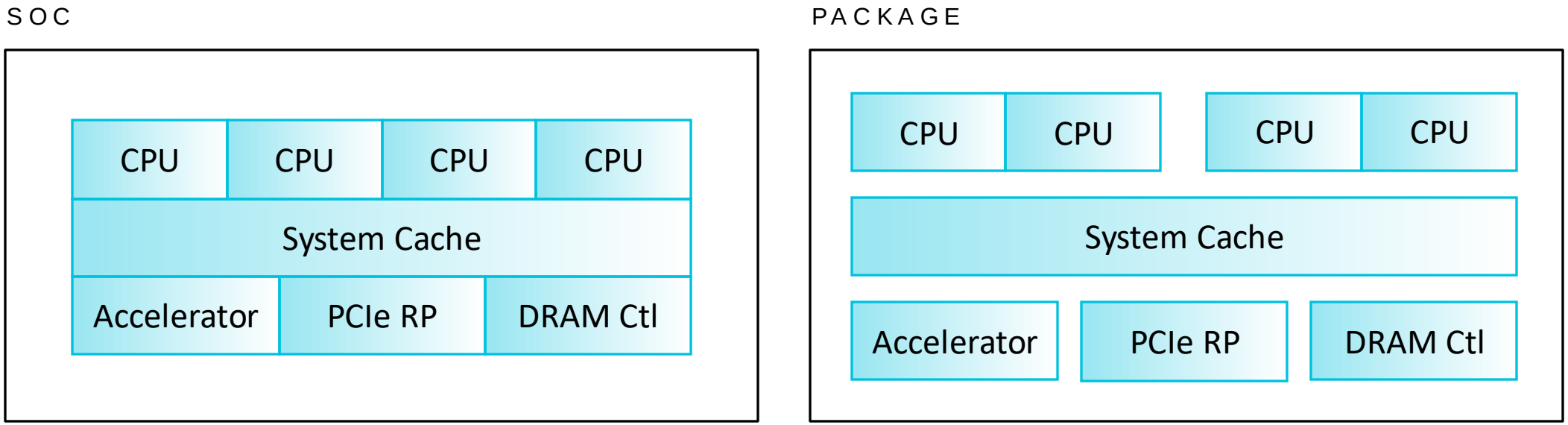
The Road to an Open Chiplet Marketplace



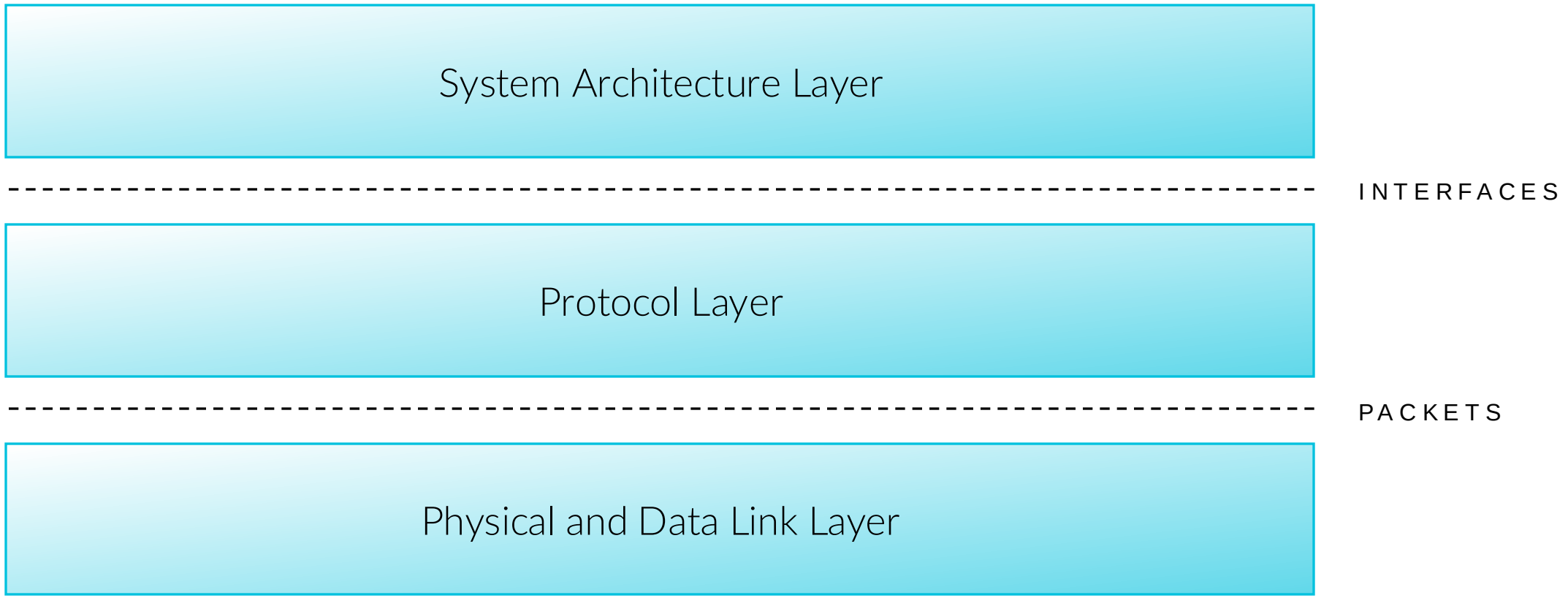
Aggregation Across the Motherboard



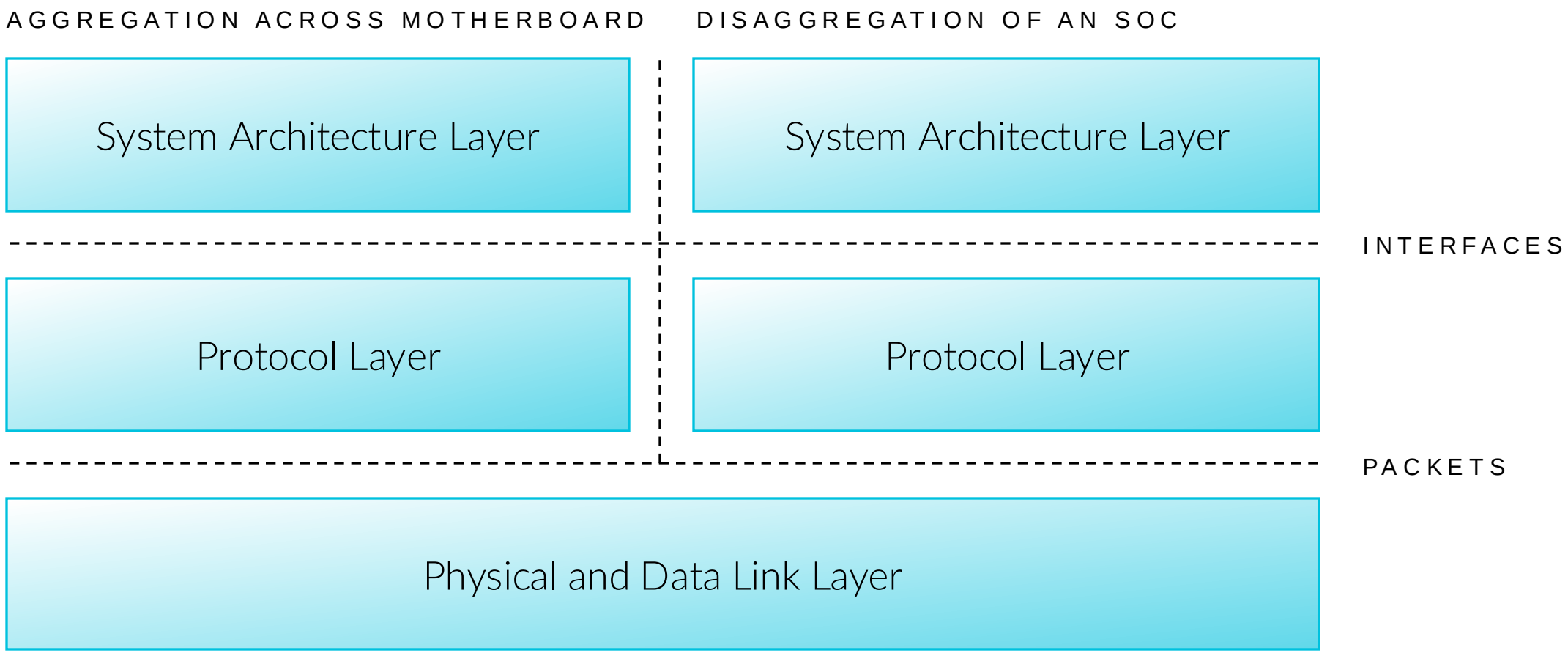
Disaggregation of a System on Chip



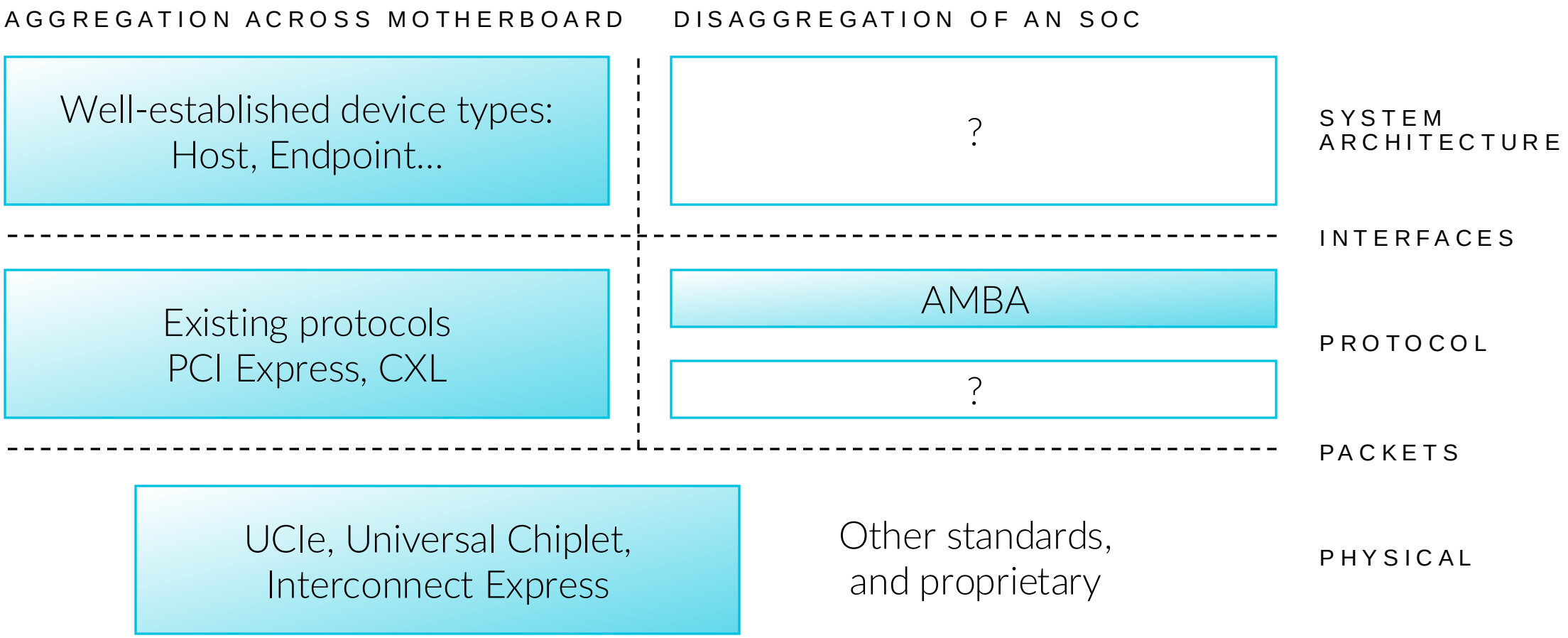
Separate into Layers…



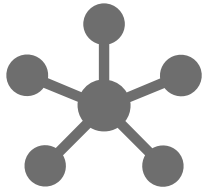
Applying to System Types…



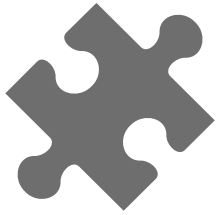
Matching to Standards Ecosystem…



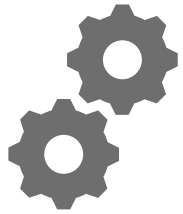
Introducing the Chiplet System Architecture



System Topologies



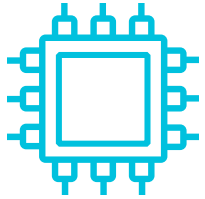
Chiplet Types



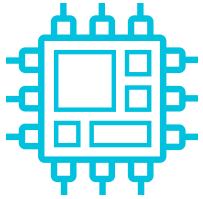
Interface Mapping

Why AMBA?

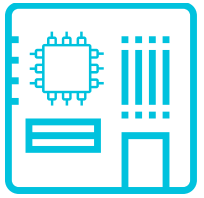
AMBA is the standard for SoC communications underpinning silicon IP & fabless design today



Fragment a monolithic die into multiple chiplets



System consolidation of platform components into chiplets



AMBA most prevalent on-die fabric

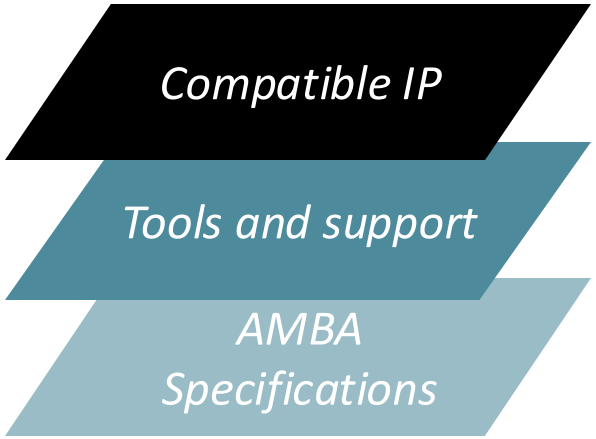
PCIe/CXL interface of choice

Widely adopted open standard

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

Common standard for a variety of designs

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

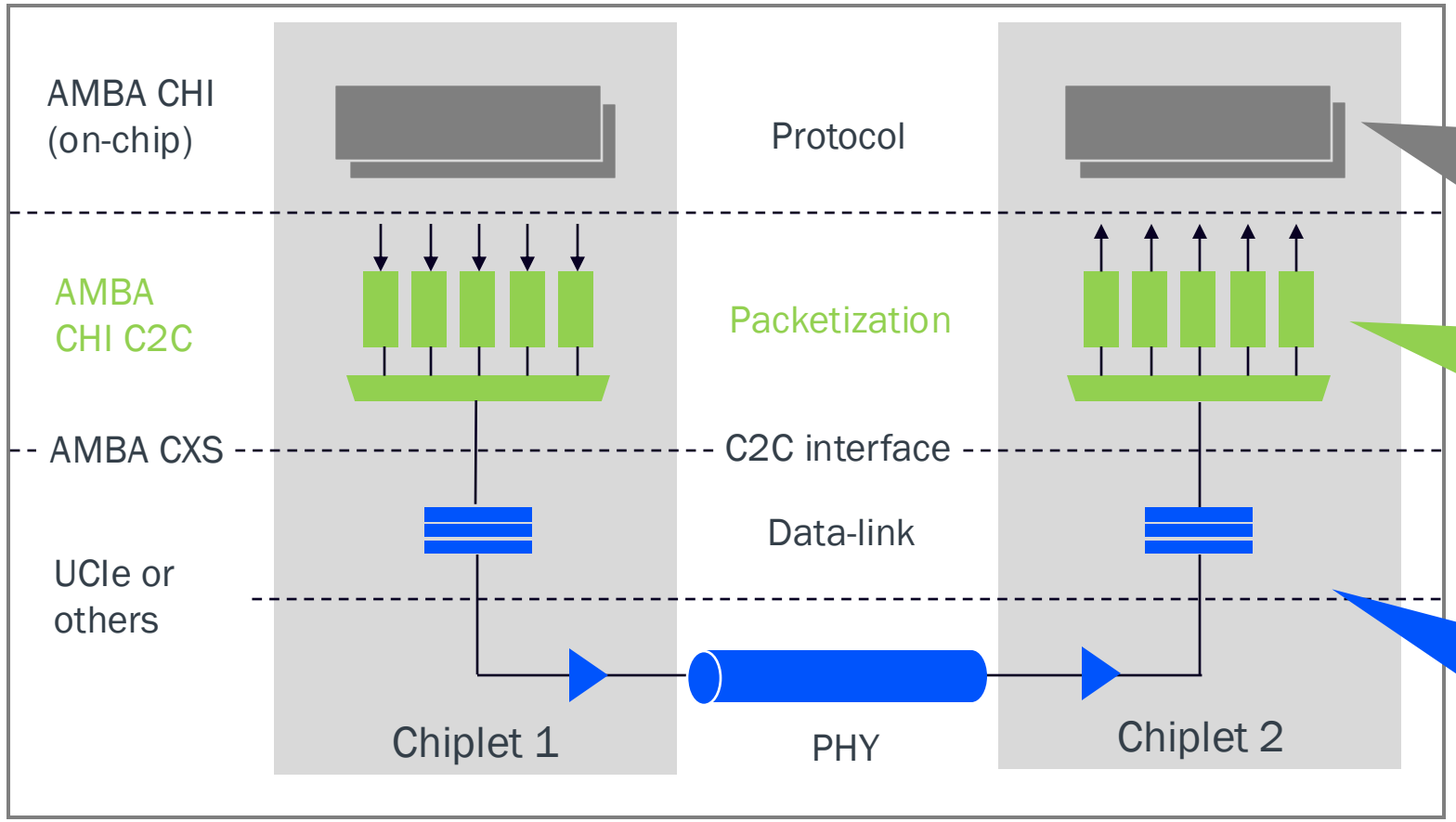


Thriving ecosystem & comprehensive marketplace

https://www.arm.com/architecture/system-architectures/amba

Chiplet-to-Chiplet Architecture

Layered architecture allows use of third-party and industry standard data-link & PHYs

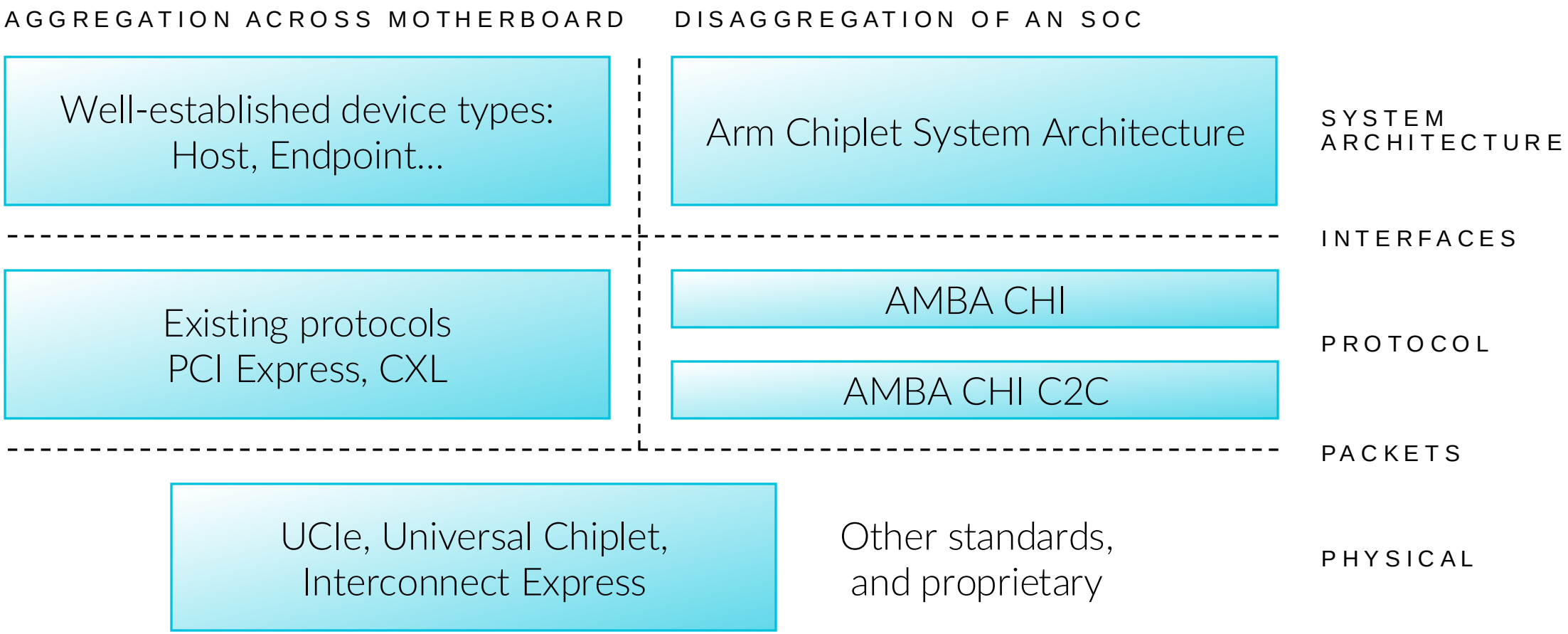


- Transporting the same on-chip protocol allow seamless use of architecture features without protocol conversion

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

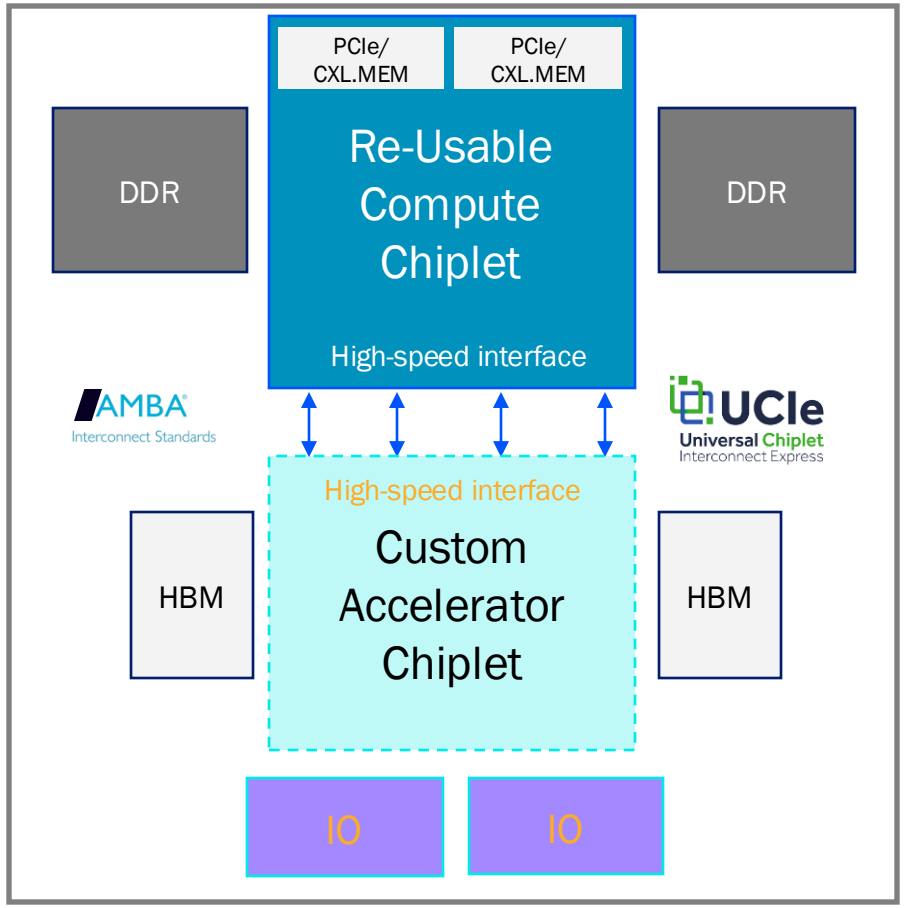
- Streaming interface with add. flit formats provides link robustness using UCIe defined data-link CRC & retry

The Standards Stack for Chiplets

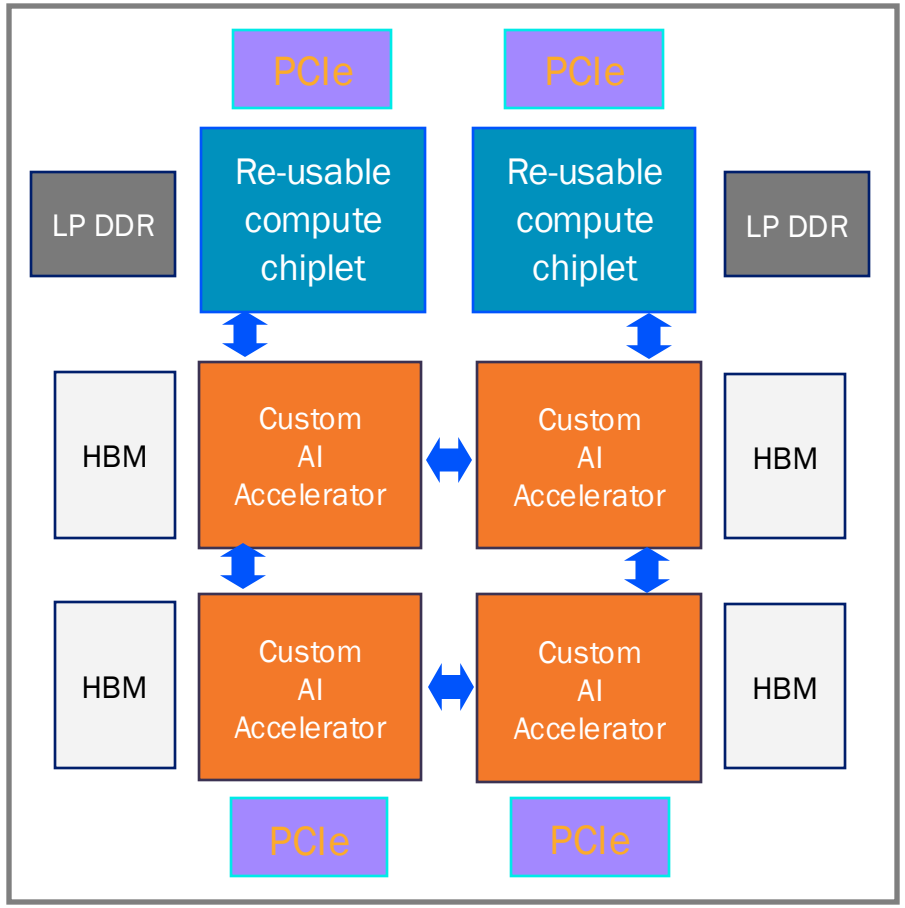


Real-world Chiplet Implementation Examples

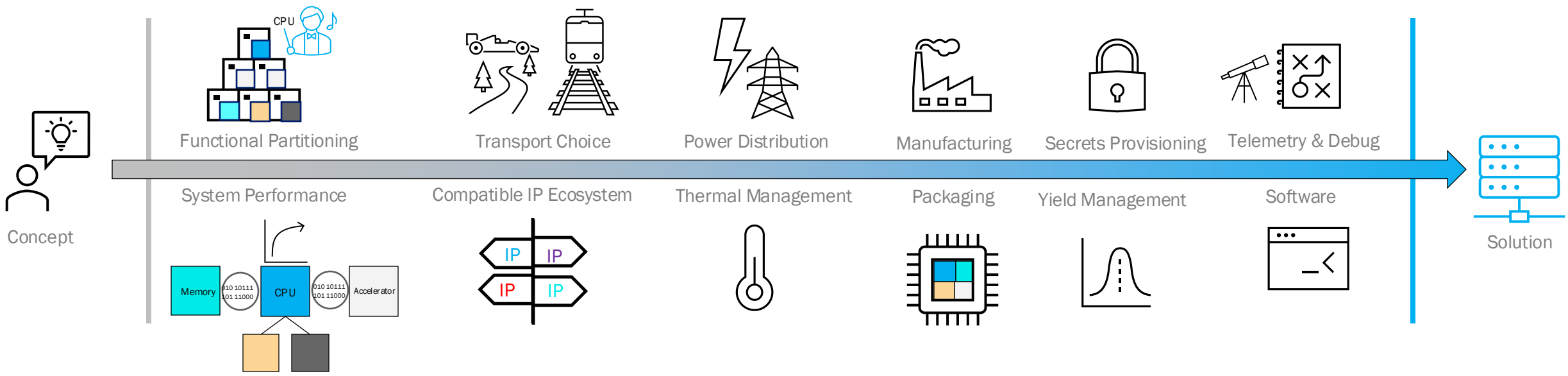
Standards-compliant compute and I/O dies, supporting attachment of market-specific accelerator die



Multi-party compute and accelerator chiplet design, fabrication, and advanced packaging collaboration



But Chiplets Introduce Challenges



Specifications from Industry Standards Bodies

Arm Total Design Partner Ecosystem

A global network of expert silicon design partners

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