

High Performance Connectivity IP and Chiplets from Alphawave Semi

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ALPHAWAVE SEMI

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About Alphawave Semi



Founded: 2017



Offices: Toronto, Ottawa, Silicon Valley, London, Tel-Aviv, Bangalore, Pune, Taipei, Shanghai



Mission: Vertically integrated Semiconductor provider of connectivity solutions



Key products: Connectivity IP, Chiplets, Custom Silicon and Optical Silicon Products



Employees: ~1200+ worldwide



Key Facts:

- 2024 – 2020 IP Partner of the year TSMC
- 3DIC Alliance Founding Member TSMC
- TSMC ASIC Supplier Partner
- Samsung IP Partner of the Year

Global presence



Target applications



Alphawave Semi Technology Offering

Extensive Product IP Subsystem Solutions to cover all Datacenter and AI connectivity needs

PCIe/CXL



High-speed Interface IP for data centre compute – CPU, GPU, AI & FPGA

PCIe6/PCIe7/ CXL 3.0



Ethernet



112 Gbps & 224 Gbps PAM4 Interface IP for Networks – Switches, Routers, DPUs, NICs

800G, 1.6T Ethernet

UALink and UEC



Memory IP



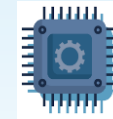
Memory Interface IP for DRAMs & HBM – CPU, GPU, AI, FPGA, DPUs

HBM3 and HBM4

CustomHBM4



Chiplets



Chiplet Interface IP
UCle D2D
2.5D and 3D

UCle, Streaming,
PCIe, CXL

UCle64G and 3DIO



Controllers and PHYs End to End Solutions

Relevance of Alphawave Semi – We solve Data Center Communications

AI – AN INFLECTION POINT

ChatGPT2.0
1.5 Billion
parameters
40GB data

100X

ChatGPT4.0
175 Billion
parameters
45TB data
(one million feet
of bookshelf
space)
Text + Images

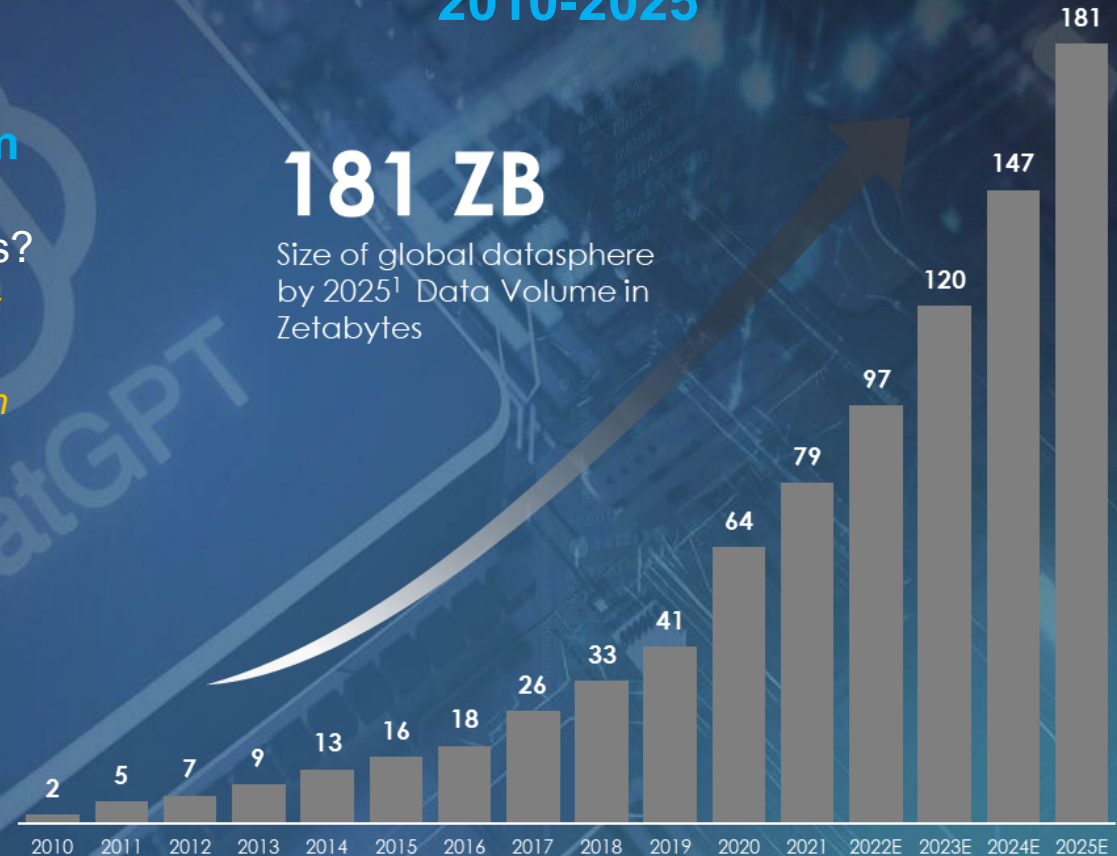
500X

Next Gen
Trillion*
parameters?
** number of
synapses in
human brain*

EXPONENTIAL RISE IN DATA 2010-2025

181 ZB

Size of global datasphere
by 2025¹ Data Volume in
Zetabytes



(1. The Data Center Journey, From Central Utility To Center Of The Universe (semiengineering.com).
Source Statista <https://semiengineering.com/thedatacenter-journey-from-central-utility-to-center-of-the-universe/>)

Why is our solution valuable - Connectivity is a hard problem to solve



The Rise of AI at the insatiable amount of Compute Needs

Parallel computing requires high bandwidth for

- memory
- Interconnect



Diversity of Applications and Workloads

- Ease of integration into various platforms
- Right balance between cost and performance



Technology Development and Deployment

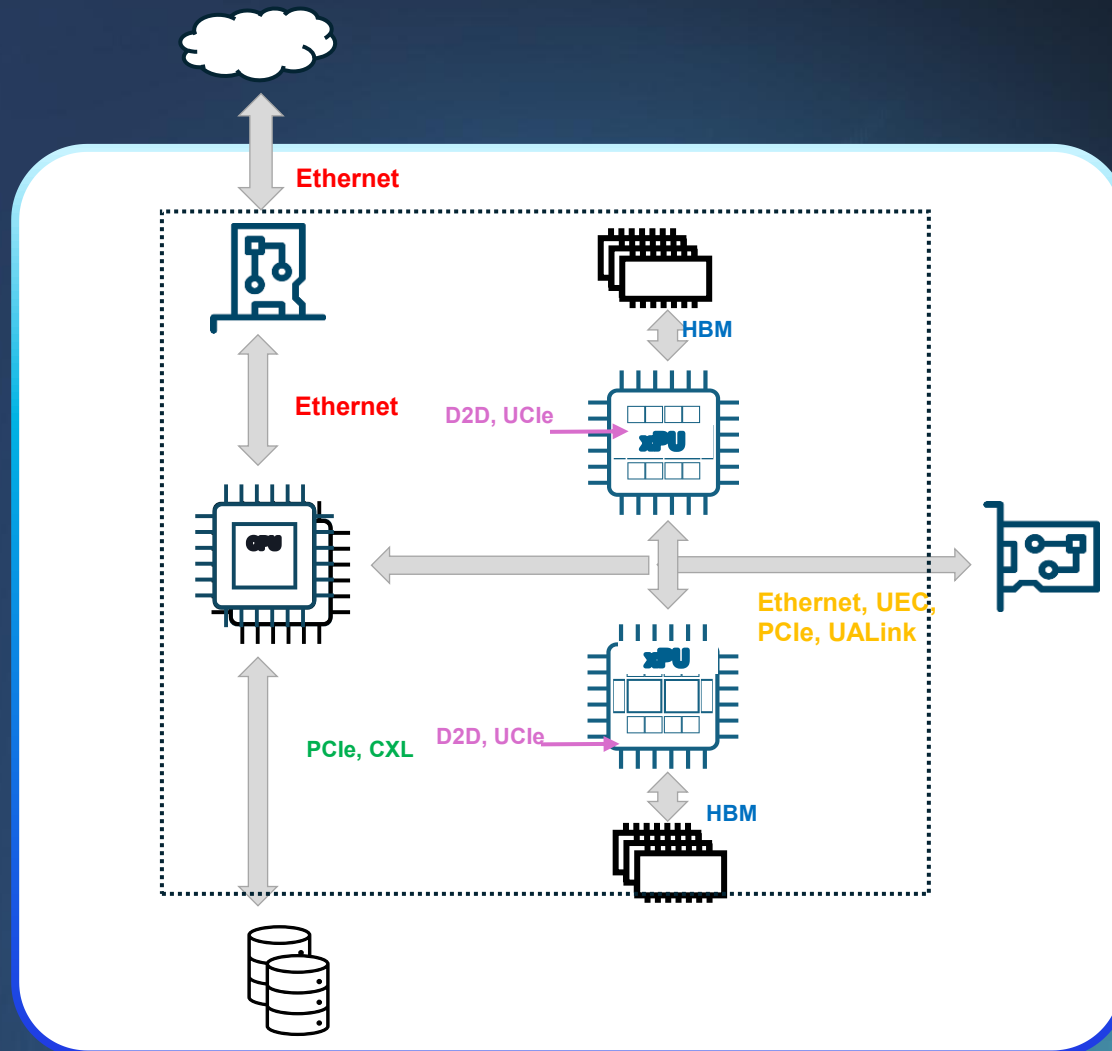
Drive IP into leading edge

- Process technologies
- Foundries


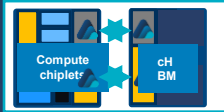
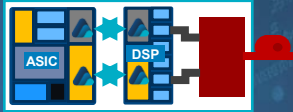


System View to Communications Data Center

- **Front End Network**
 - Ethernet
- **Back-End Network**
 - Scale Out – Ethernet, UEC
 - Scale Up – PCIe, UALink
- **Compute to IO**
 - PCIe or CXL.IO
- **Compute to Memory**
 - HBM
 - CXL.mem
- **Disaggregated Compute**
 - D2D – UCLe



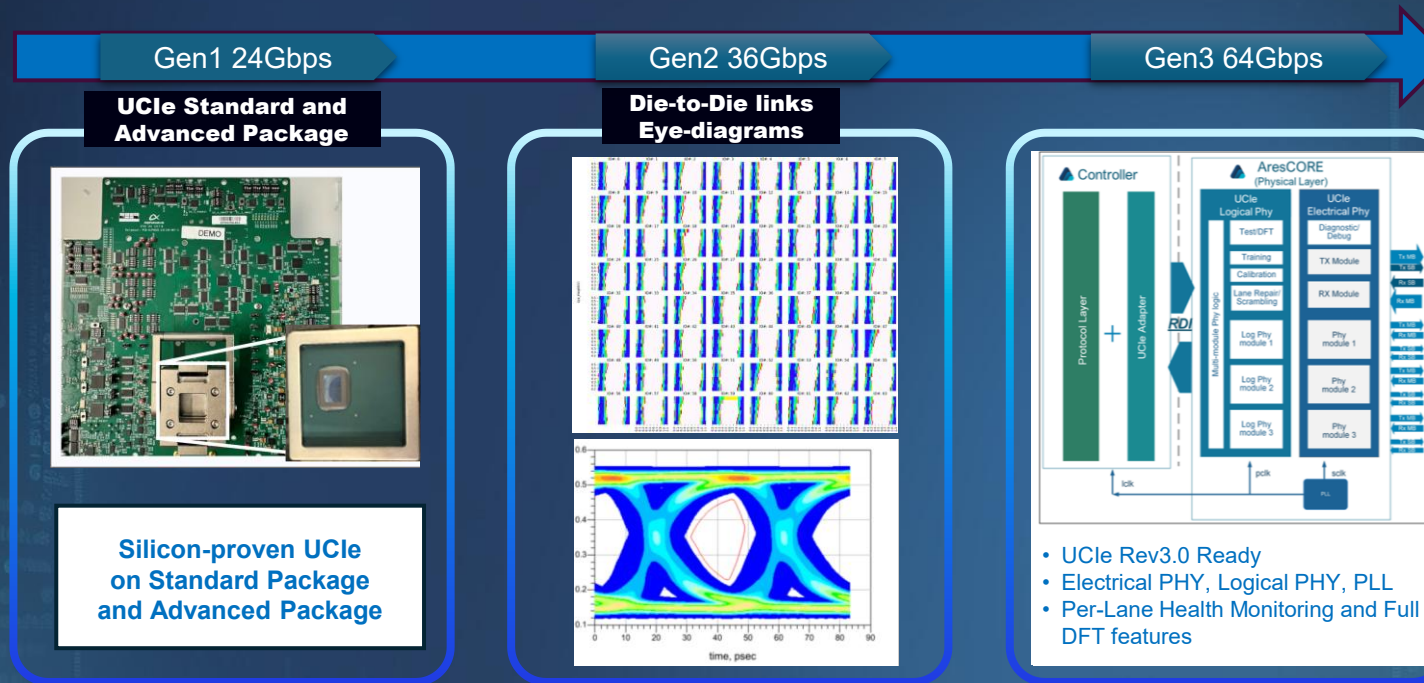
Alphawave IP Chiplet Building Blocks: UCle

	COMPUTE TO COMPUTE	COMPUTE TO MEMORY	COMPUTE TO ELECTRICAL IO COMPUTE TO OPTICAL IO
Topology			
PHY	UCle – Standard Package UCle – Advanced Package	UCle – Standard Package UCle – Advanced Package	UCle – Standard Package UCle – Advanced Package
Data Rates	32 Gbps / 64 Gbps	32 Gbps	32 Gbps / 64 Gbps
Protocol	UCle Streaming	UCle Streaming to cHBM UCle Streaming to DDR	UCle Streaming or Retimer

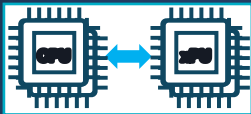
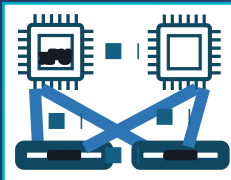
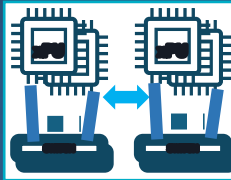
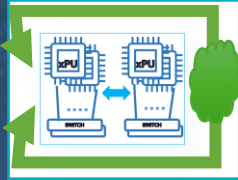
Alphawave Semi UCle D2D Building Blocks are available today in Multiple Technology Nodes and various foundries

Alphawave Semi UCle Silicon Proven

Delivering Proven Silicon Success



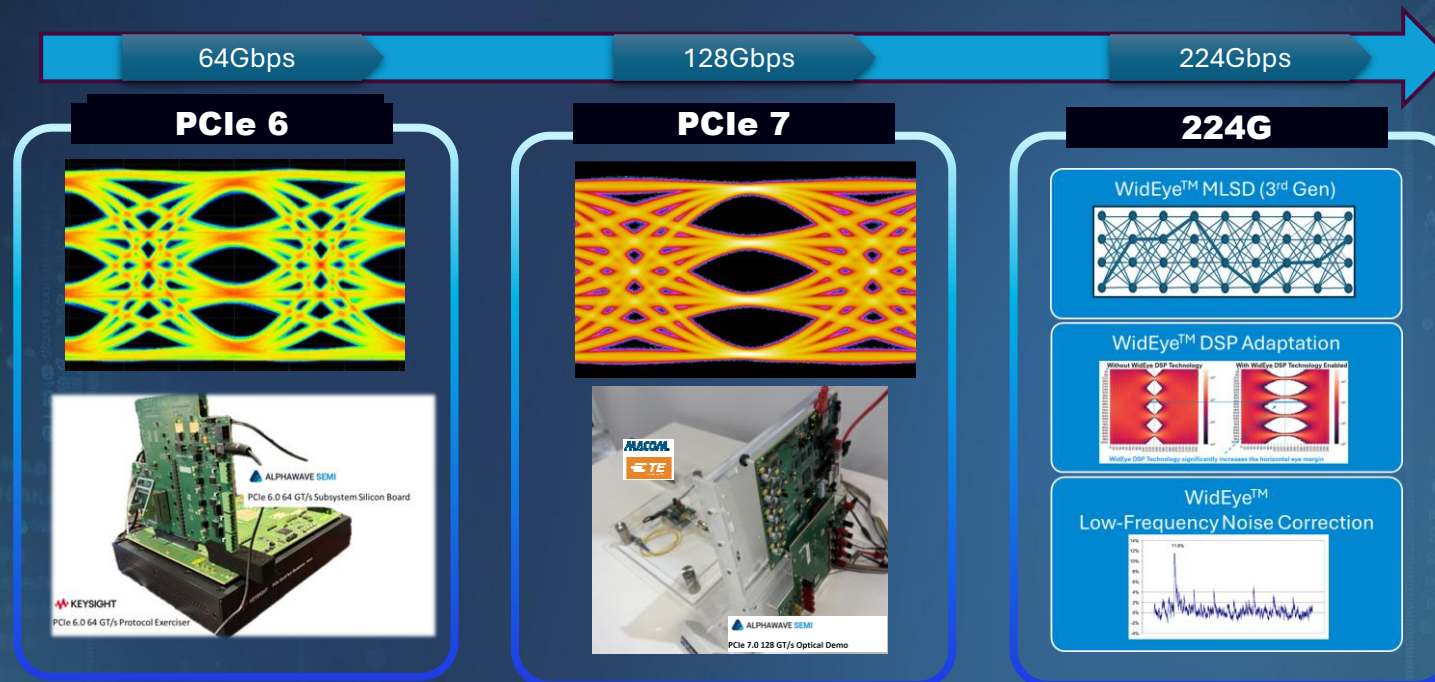
Alphawave Semi Chiplet Building Blocks: PCIe, UALink, UEC, Ethernet

	PCIE6, PCIE7	UALINK	UEC	STANDARD ETHERNET
Topology				
	xPU to CPU Memory Expander Scale UP	Scale UP	Scale OUT	Back End / Datacenter
Data Rates	64 Gbps, 128 Gbps	212.5 Gbps	106.25G, 212.5G	106.25G, 212.5G
Protocol	PCIE and CXL	UALINK	Ultra Ethernet	Ethernet

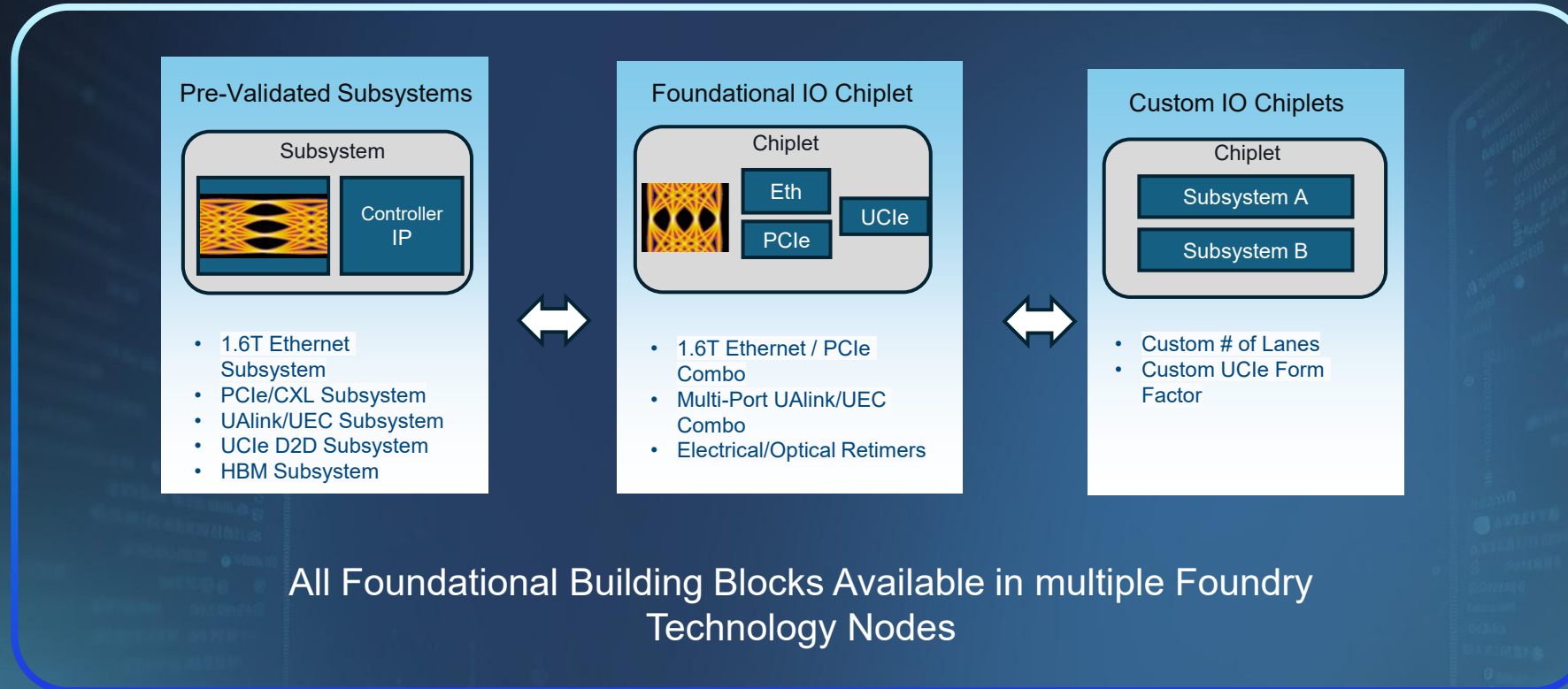
Alphawave Semi Building Blocks available today in Multiple Technology Nodes

Alphawave 3rd Gen DSP SerDes IP: PCIe, Ethernet

Available in multiple technology nodes



Integrating Alphawave Semi Solutions



Summary

- Alphawave Semi solves critical data communication for (AI) servers
- Delivering scalable, interoperable (AI) solutions
- Our IP connects compute, memory, and IO devices
- We accelerate TTM with chiplet solutions
- Our IP is here today and powers next gen xPUs and chiplets
- We enable multiple engagement models: IP, chiplet, custom design

Thank You