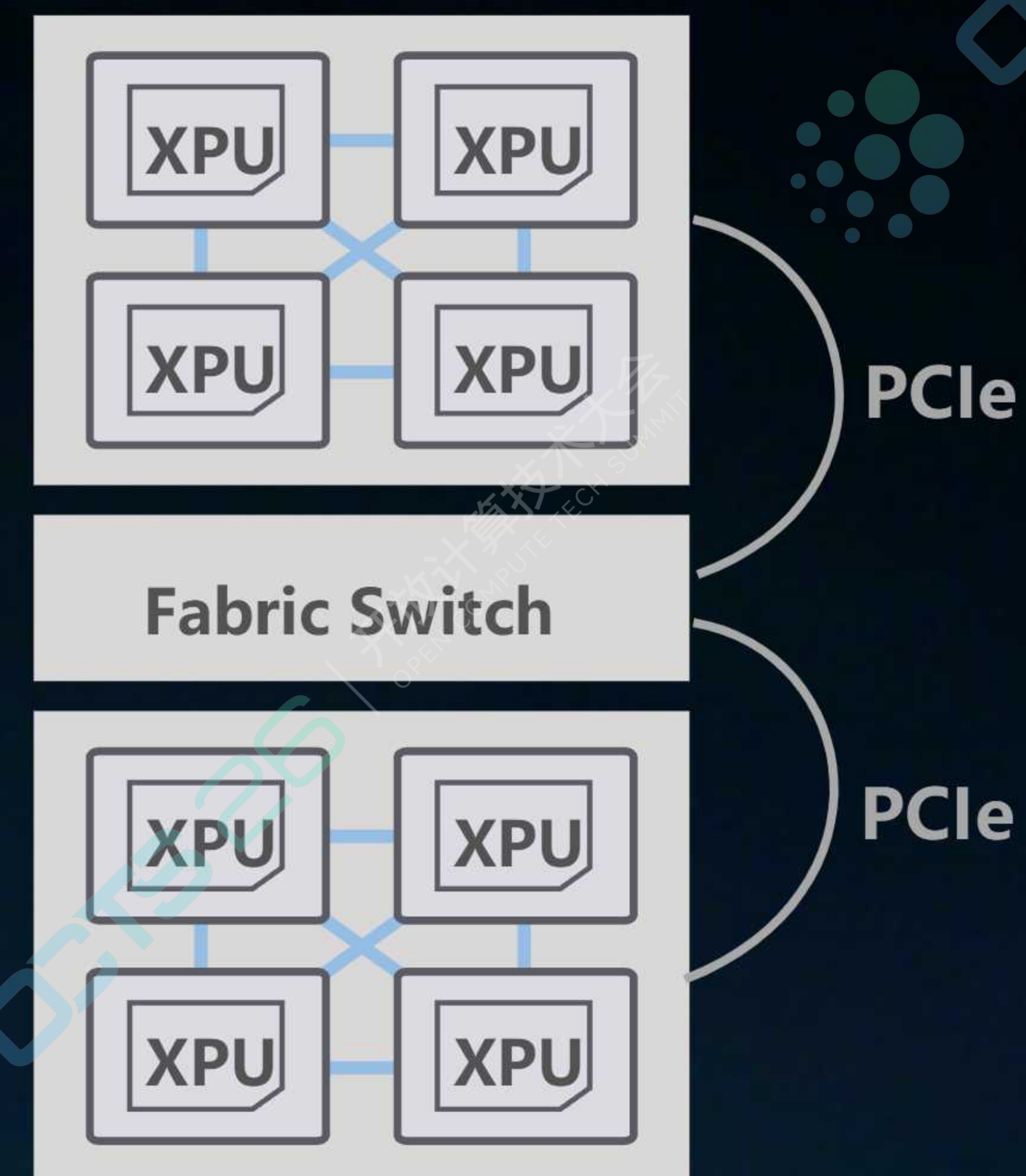


AI Infrastructure Connectivity: The Role of Retimers, AECs, and Intelligent Diagnostics in Building Scalable Systems

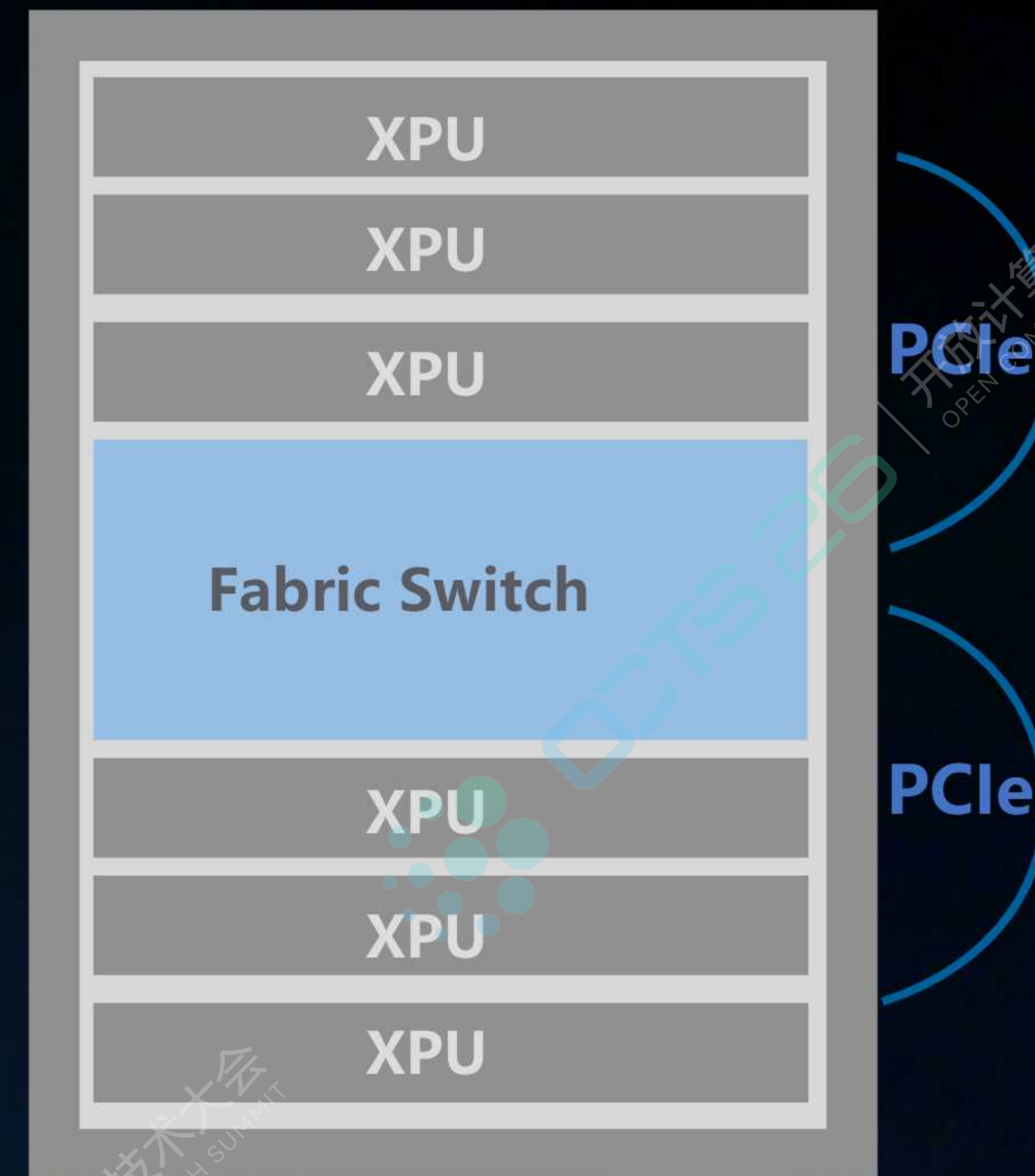
Ricky Chan

Technical Marketing Director

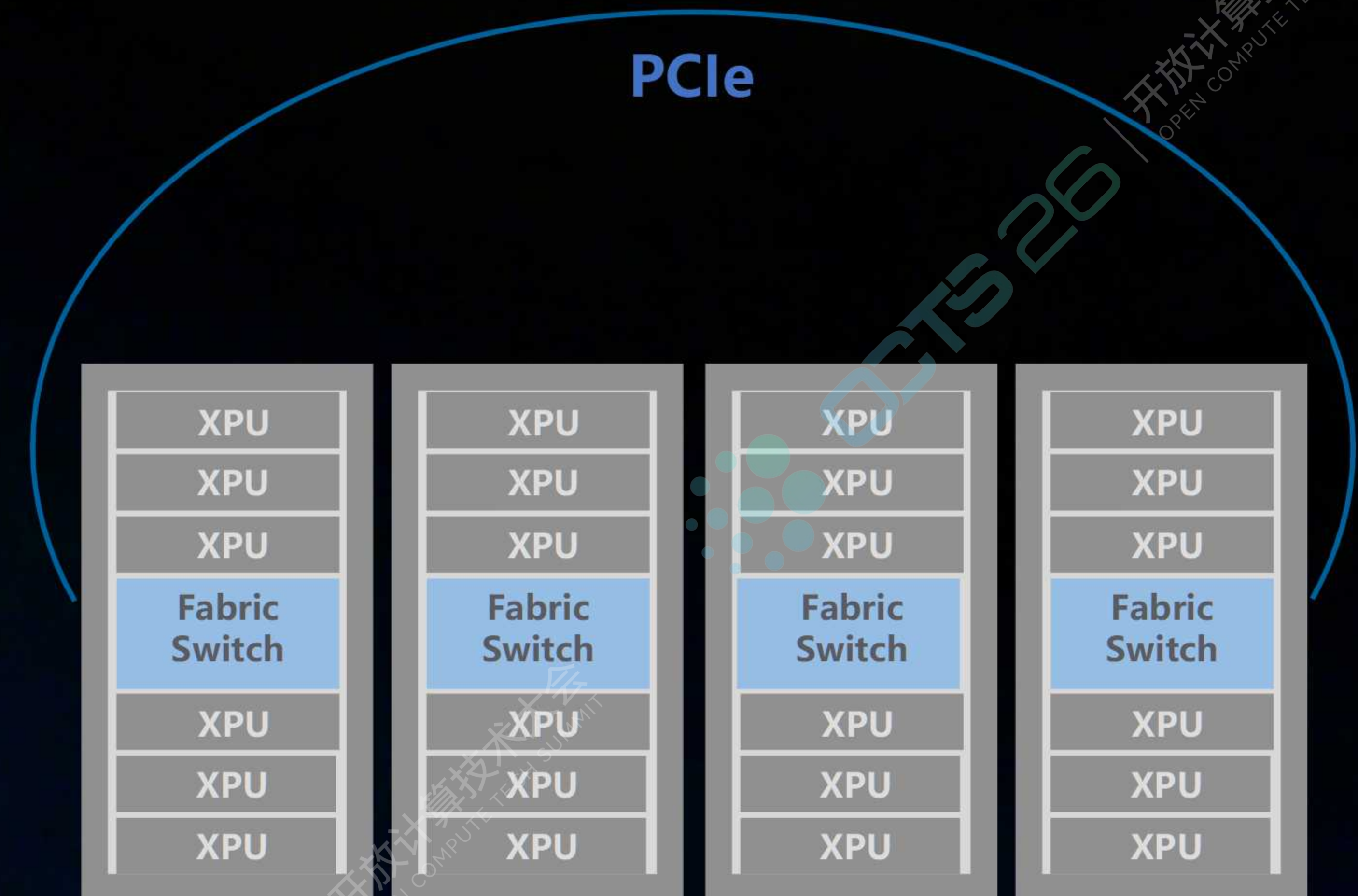
AI Infrastructure Connectivity through PCIe



Couple of XPU clusters



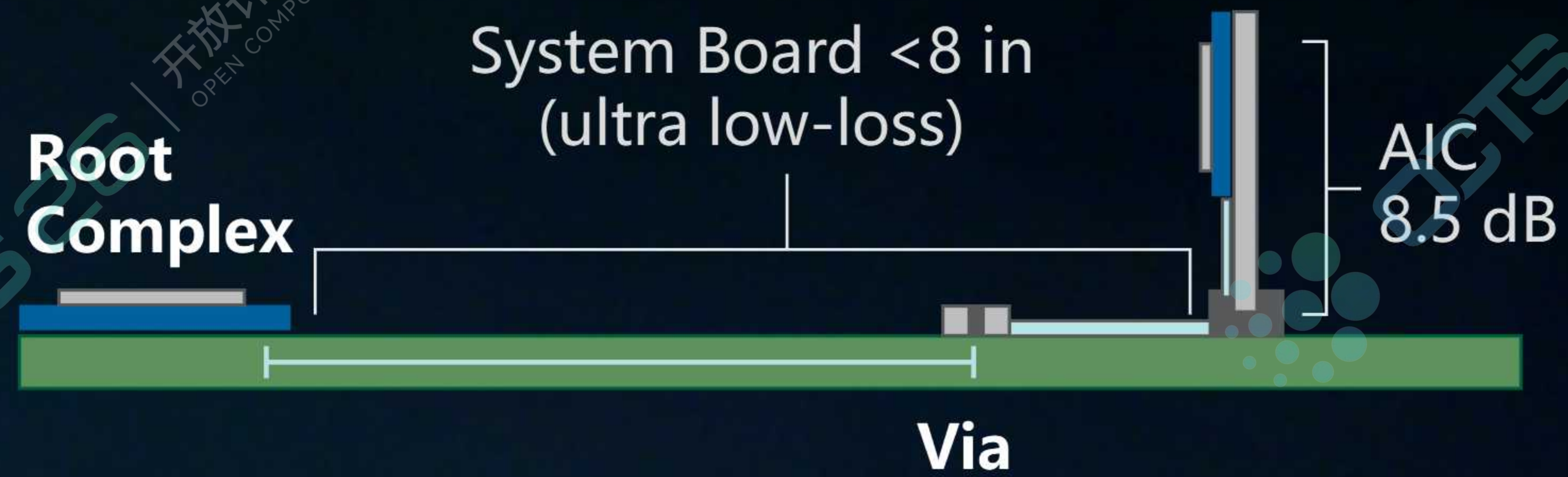
10+ XPUs



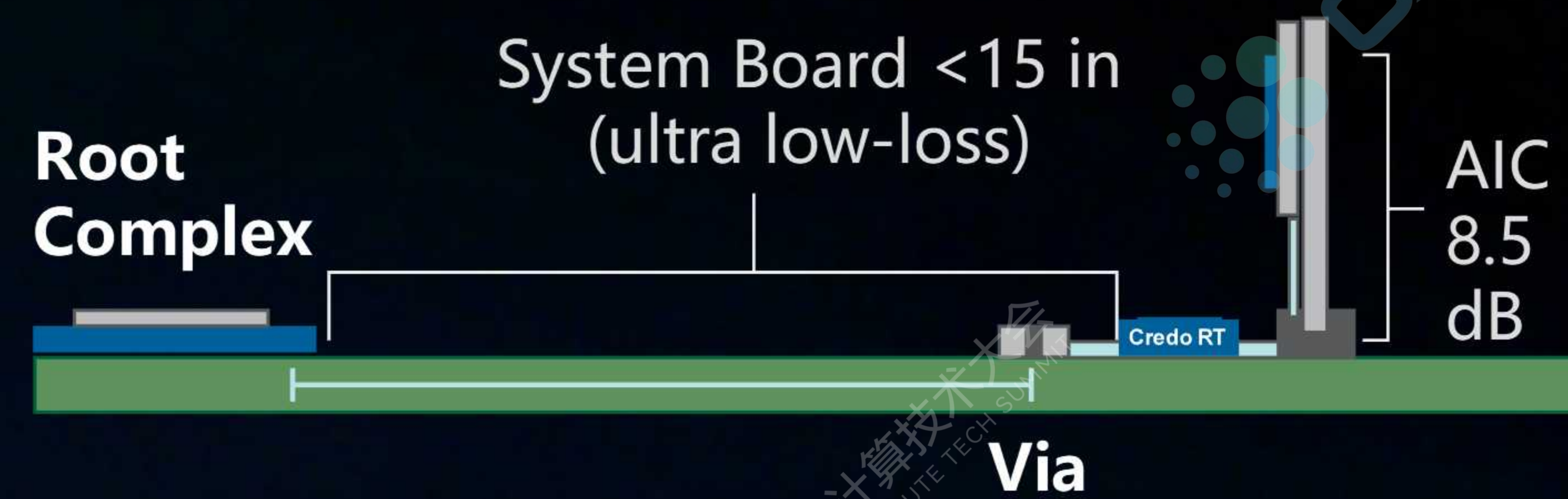
100+ XPUs

Challenges with PCIe Gen 6 channels

Without Retimer (32dB channel budget)

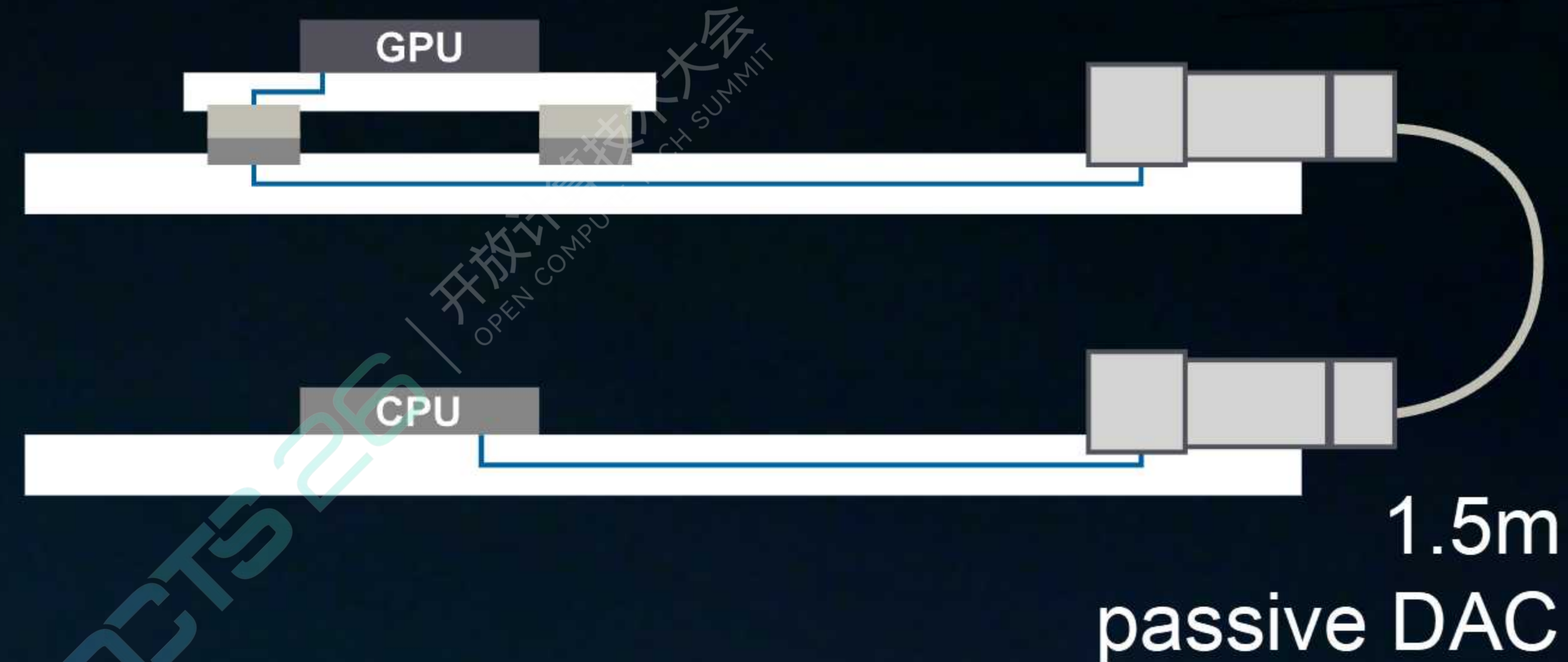


With Retimer (32dB channel budget)



AI Infrastructure Scaling Challenges

CPU to GPU Connectivity with External Copper Cabling



Item	IL @ 16GHz	IL @ 32GHz
GPU Package	5.00	7.50
Trace on Baseboard PCB (50mm)	1.40	2.20
Mated Mezzanine Connectors	1.20	1.80
Trace on Baseboard PCB (250mm)	7.00	11.00
Via	0.40	0.65
OSFP-XD Connector	0.90	1.30
OSFP-XD Module PCB	0.70	1.10
Twinax Cable (28 AWG, 1.50m)	6.30	10.05
OSFP-XD Module PCB	0.70	1.10
OSFP-XD Connector	0.90	1.30
Trace on Baseboard PCB (200mm)	5.60	8.80
Via	0.40	0.65
CPU Package	8.00	10.00
Segment 1 Total	38.50	57.45
SPEC	32dB	36dB

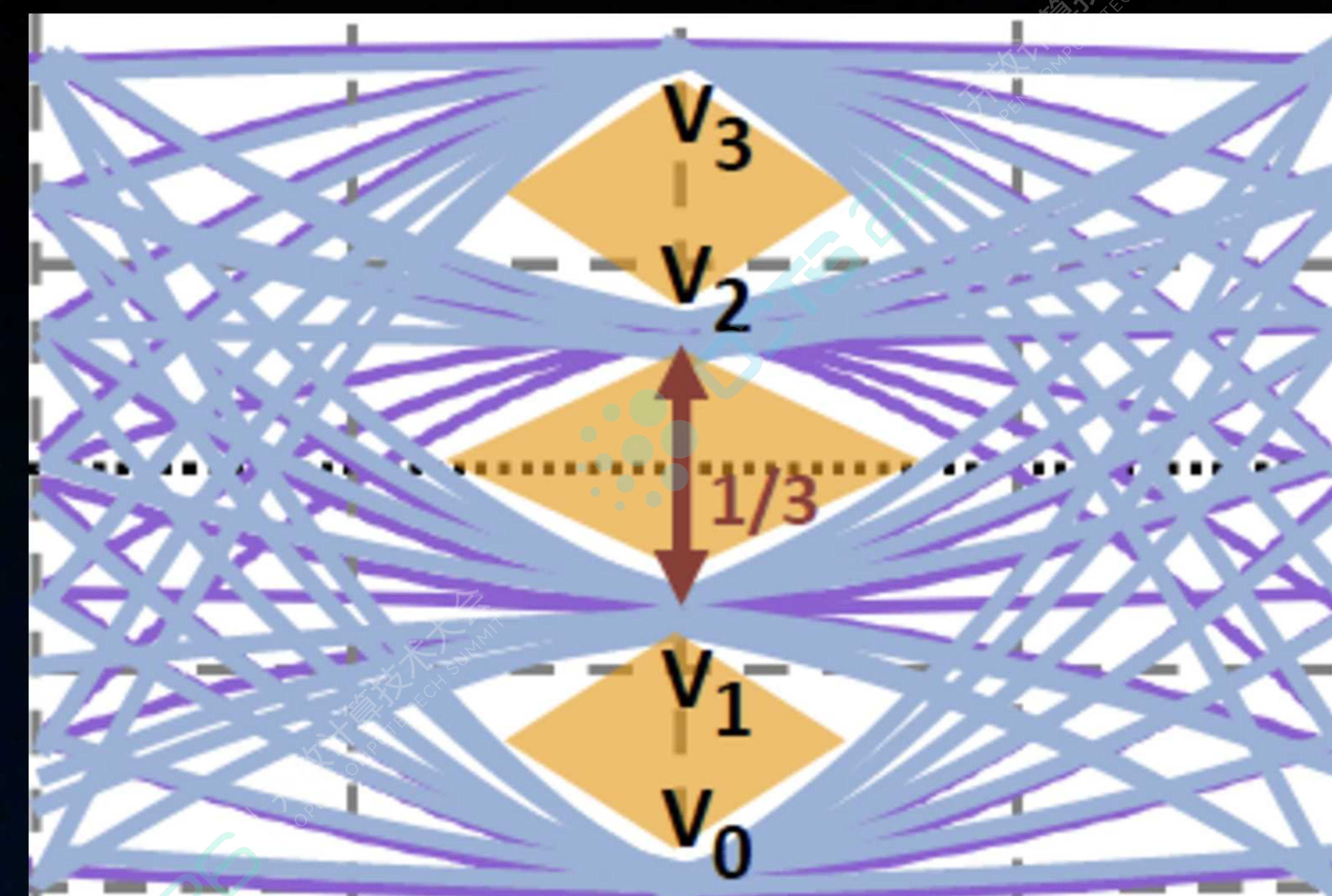
Why signal integrity is becoming the bottleneck for AI scaling

NRZ to PAM4 Signaling shrinks margin

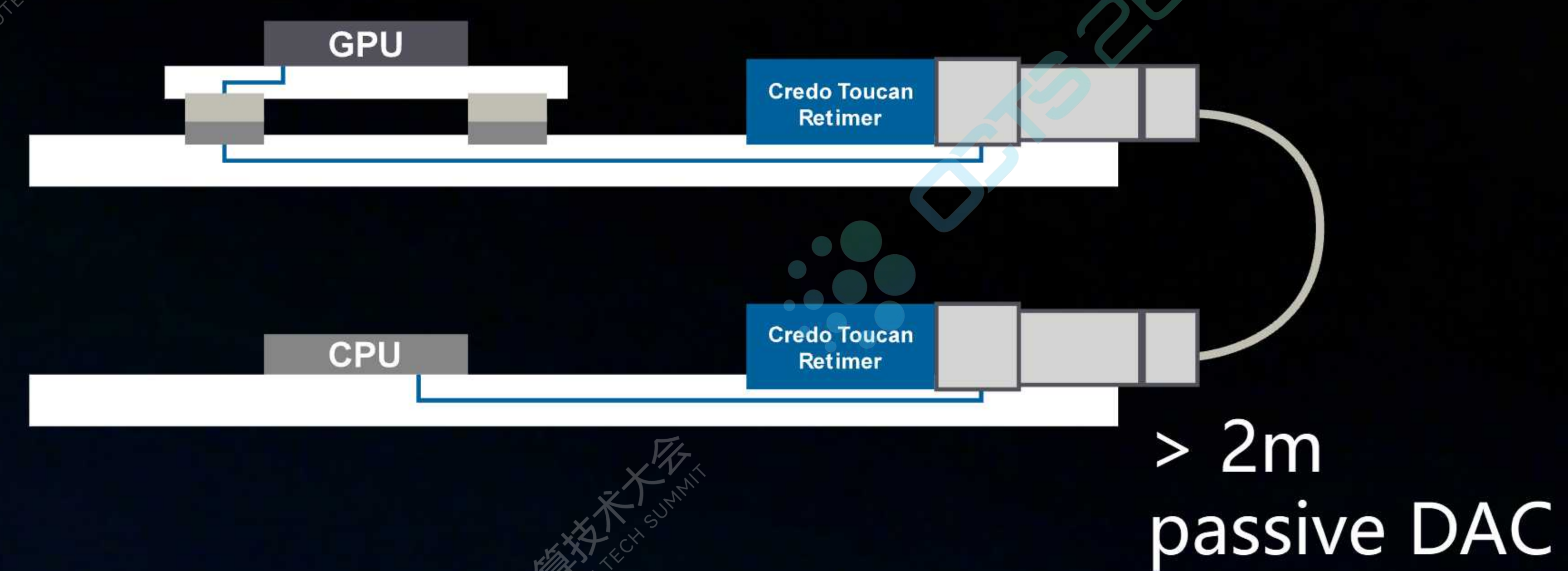
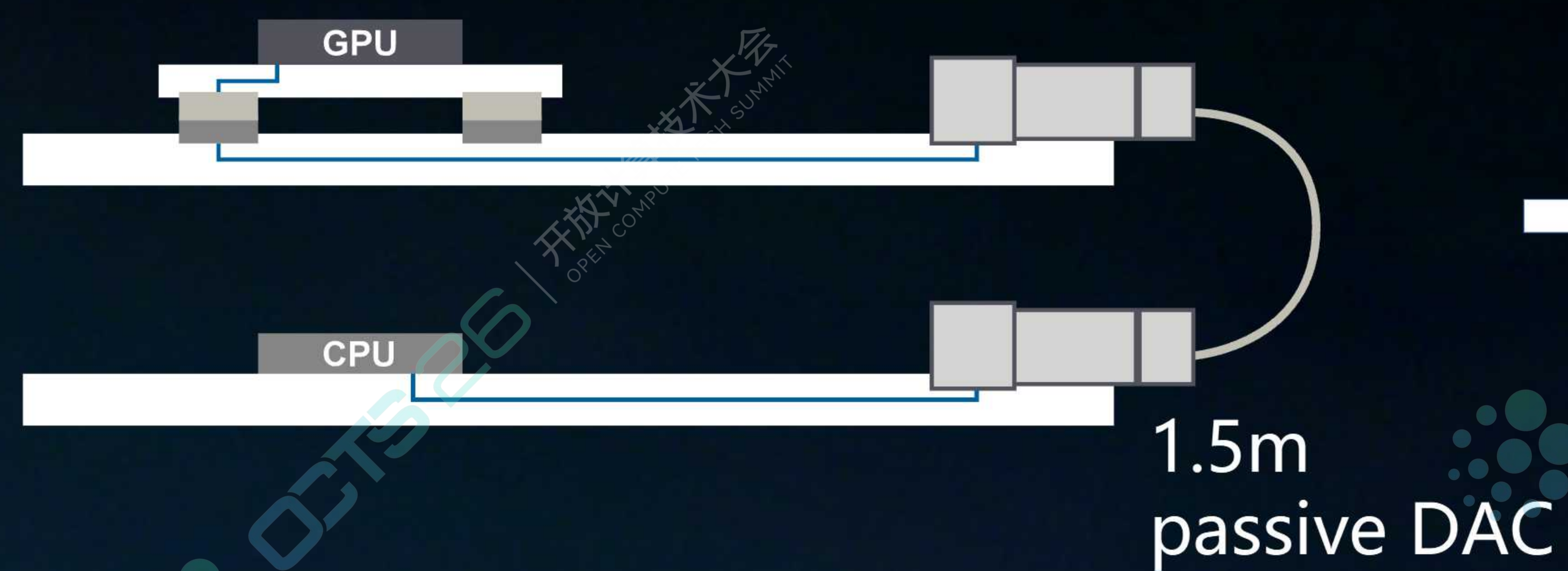
PAM-4 signaling helps channel reach but SNR degrades, more susceptible to jitter and noise

Limitation of passive DAC cables

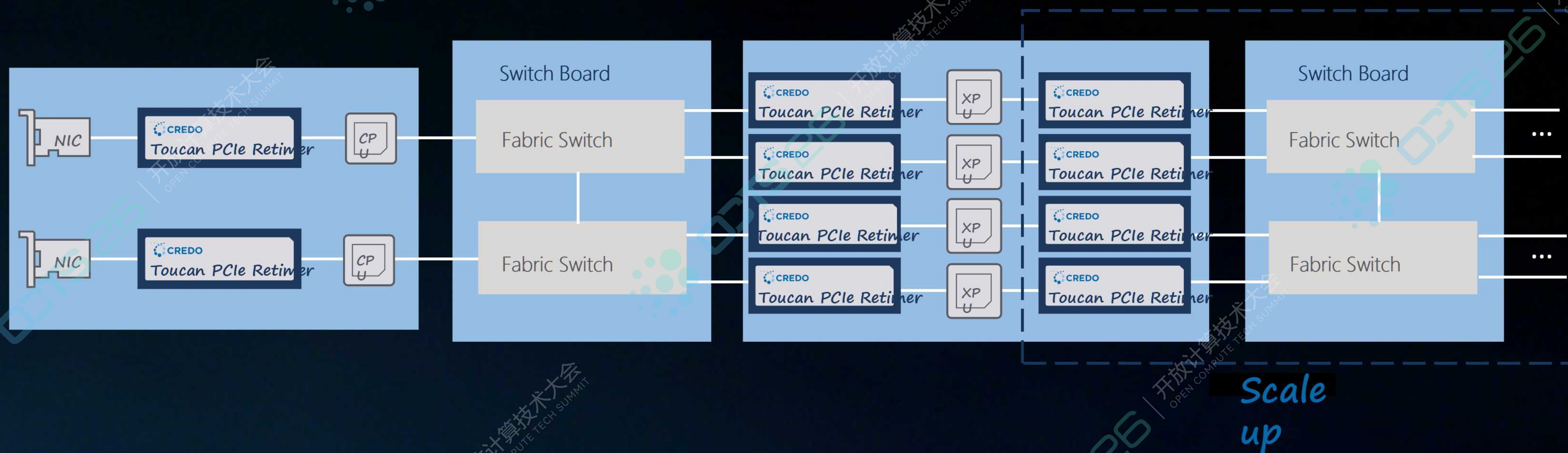
Physics barrier to connect GPUs across multiple racks in AI clusters with DAC cables only up to about 2 meters



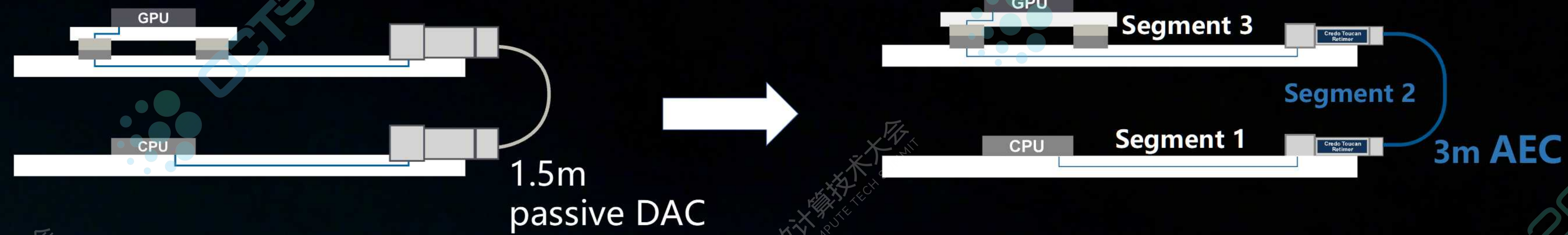
How can retimers help?



PCIe Retimers in AI Infrastructure



How can AECs help?



Item	IL @ 16GHz	IL @ 32GHz
GPU Package	5.00	7.50
Trace on Mezzanine PCB (50mm)	1.40	2.20
Mated Mezzanine Connectors	1.20	1.80
Trace on Baseboard PCB (250mm)	7.00	11.00
Via	0.40	0.65
OSFP-XD Connector	0.90	1.30
OSFP-XD Module PCB	0.70	1.10
Twinax Cable (28 AWG, 1.50m)	6.30	10.05
OSFP-XD Module PCB	0.70	1.10
OSFP-XD Connector	0.90	1.30
Trace on Baseboard PCB (200mm)	5.60	8.80
Via	0.40	0.65
CPU Package	8.00	10.00
Segment 1 Total	38.50	57.45

Item	IL @ 16GHz	IL @ 32GHz
GPU Package	5.00	7.50
Trace on Mezzanine PCB (50mm)	1.40	2.20
Mated Mezzanine Connectors	1.20	1.80
Trace on Baseboard PCB (250mm)	7.00	11.00
Via	0.40	0.65
OSFP-XD Connector	0.90	1.30
OSFP-XD Module PCB	0.70	1.10
Retimer	2.00	4.00
Twinax Cable (32 AWG, 3m)	18.00	27.30
Retimer	2.00	4.00
OSFP-XD Module PCB	0.70	1.10
OSFP-XD Connector	0.90	1.30
Trace on Baseboard PCB (200mm)	5.60	8.80
Via	0.40	0.65
CPU Package	8.00	10.00
Segment 1 Total	18.60	29.55
Segment 2 Total	22.00	35.30
Segment 3 Total	17.60	25.85

Active Electrical Cables

OSFP-XD PCIe 6.x/CXL 3.x Lossless AEC

- 1m-7m, extends CDFP by 3X
- 1.0Tb data rate, bidirectional
- Single 3.3V power supply
- Hot pluggable
- RoHS2 compliant
- Compliant with PCI-SIG OST cabling pinout standard



Active Electrical Cables

Options



Other form factors

OSFP-XD
form factor



Custom
form factor

Custom
form factor

Why Credo for AECs?

- Credo invented the AEC category in 2017

- Credo makes the best SerDes & Retimers in the industry

High-speed retimer performance relies fundamentally on the capabilities of the SerDes (delivers 40dB+ reach @Gen 6)

- Credo is the only 100% vertically integrated AEC supplier

SerDes → Retimers → Paddle card → Software → Debug → Test → Manufacturing → Support

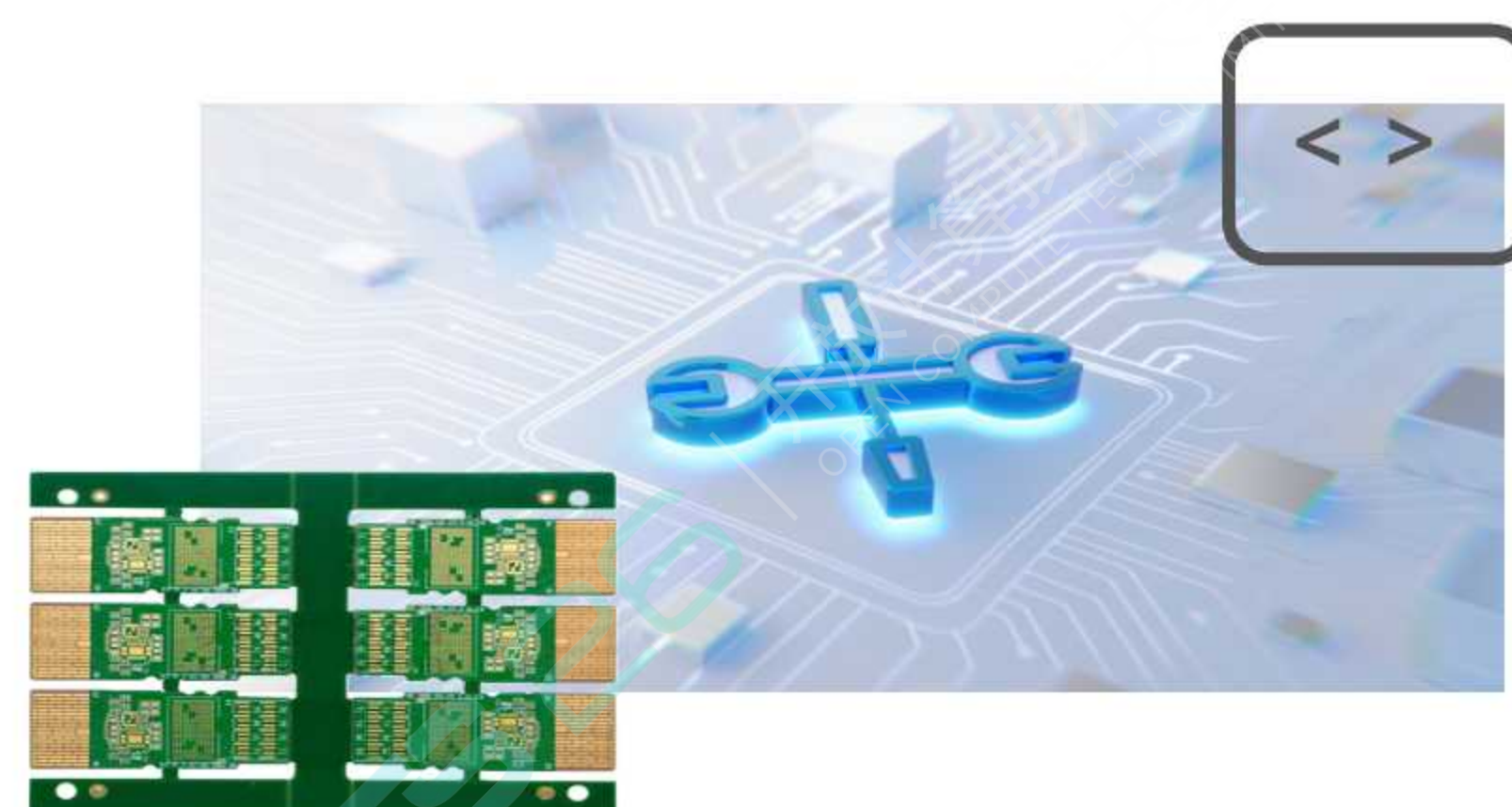
- Credo has >90% market share in AECs

- ✓ Credo has shipped over 2M AECs with over 6B hours of field data demonstrating >100Mhrs MTBF
- ✓ Credo makes more than 10,000 AECs per day – capacity on hand and inventory on hand
- ✓ Multiple Tier 1 US hyperscalers are sole sourced with Credo – Credo has never missed a shipment

Active Electrical Cables



Hardware & Firmware Design



Custom hardware design
SDK → MCU → Host Driver
All In-House

Total Ownership of FW&HW



AEC Design Validation

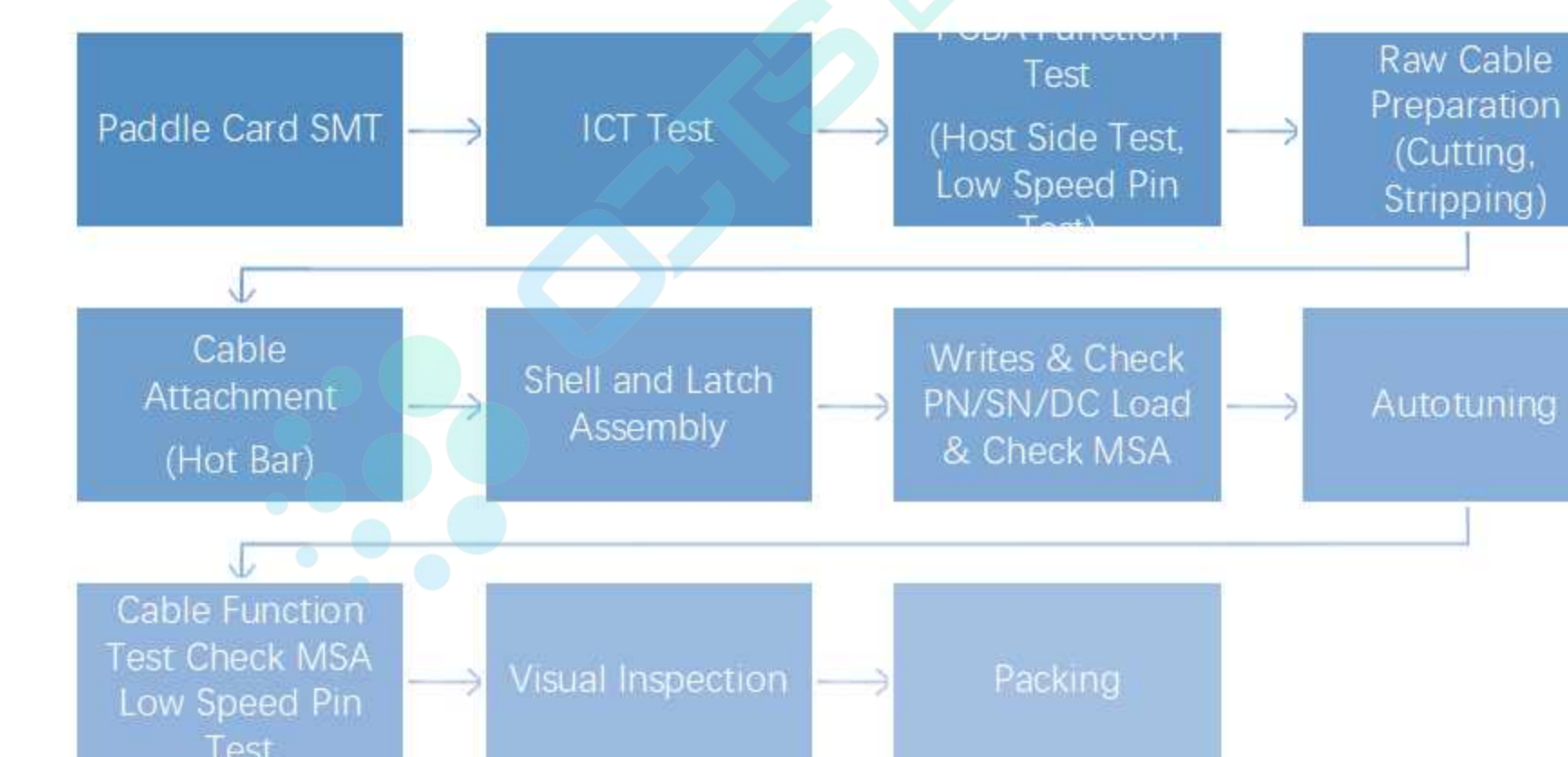


Labs full of customer equipment
Use P+V+T to break AEC links
Identify weaknesses resolve

Most Reliable AECs



AEC Manufacturing Flow

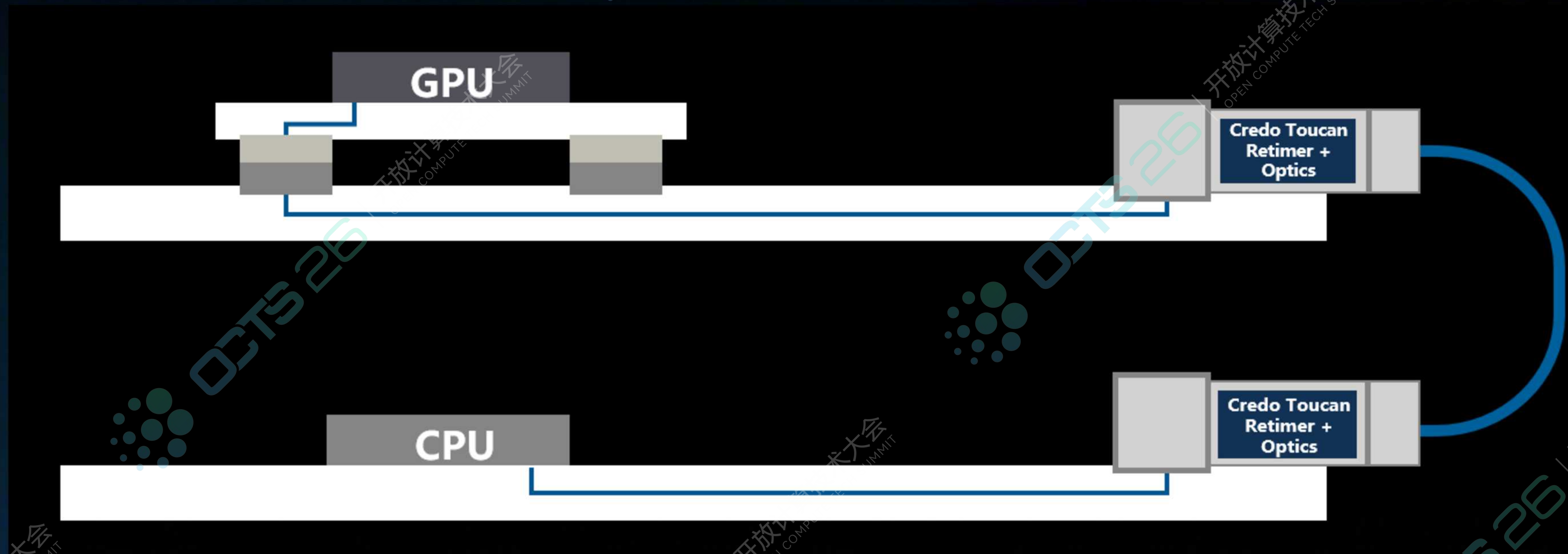


Credo process across multiple
CMs proprietary software &
testers 10,000+ AECs per day

Best Cost & Delivery

What's next after AEC?

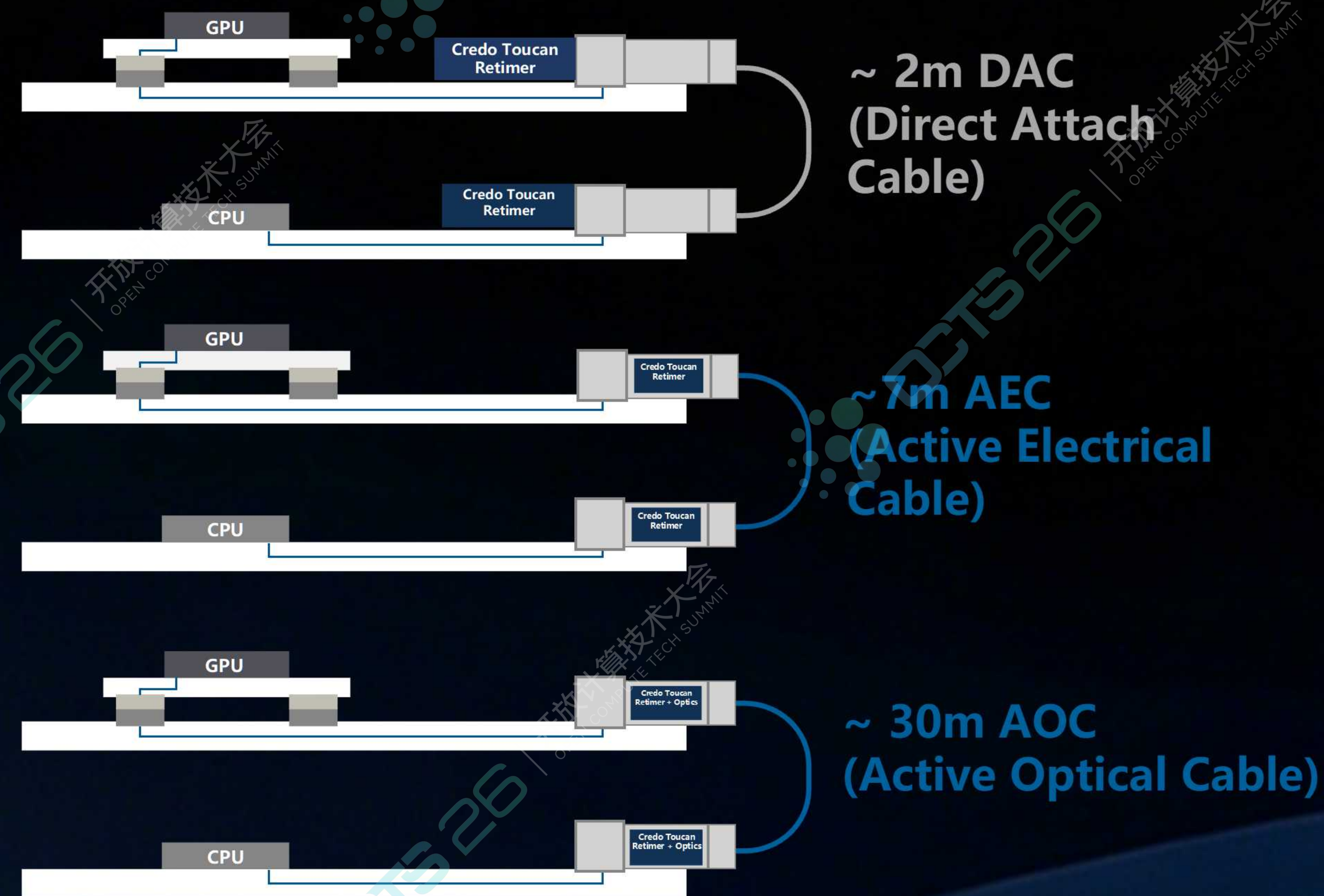
OSFP-XD AOC



30m to 50m AOC

Enable Multiple Interconnects

Same connector with
different types of cables
through OSFP-XD



Intelligent Connectivity -- PILOT

- Fast Bring-up and Configuration
- Deep SerDes Visibility
- PCIe Protocol Awareness
- Built-In Logic Analyzer
- Telemetry & Fleet Integration with SDK
- Remote monitoring and managing multiple retimers from different sites



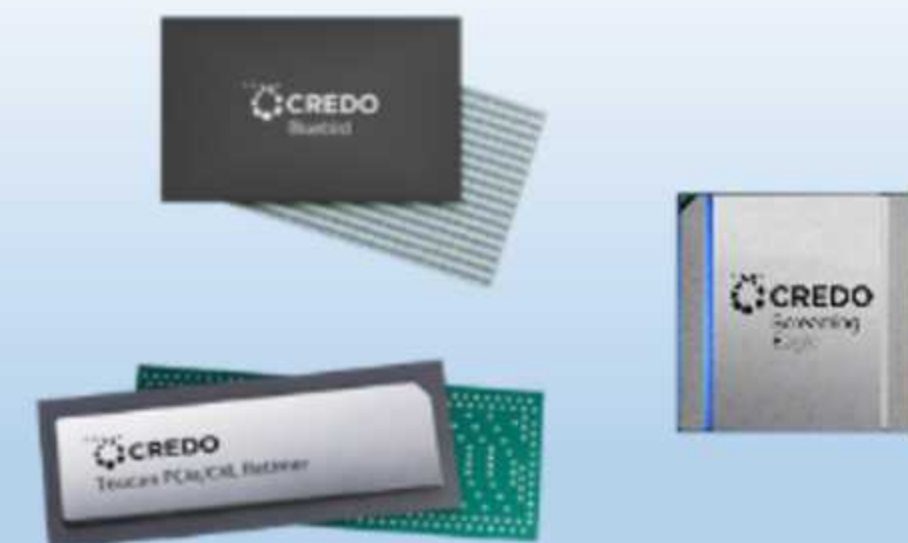
Live Demo with 7m AEC



Credo Solutions – Addressing Every Data Center Connection

All based on Credo advanced SerDes technology

PCIe, Retimers & Optical
DSP and SiPho PICs



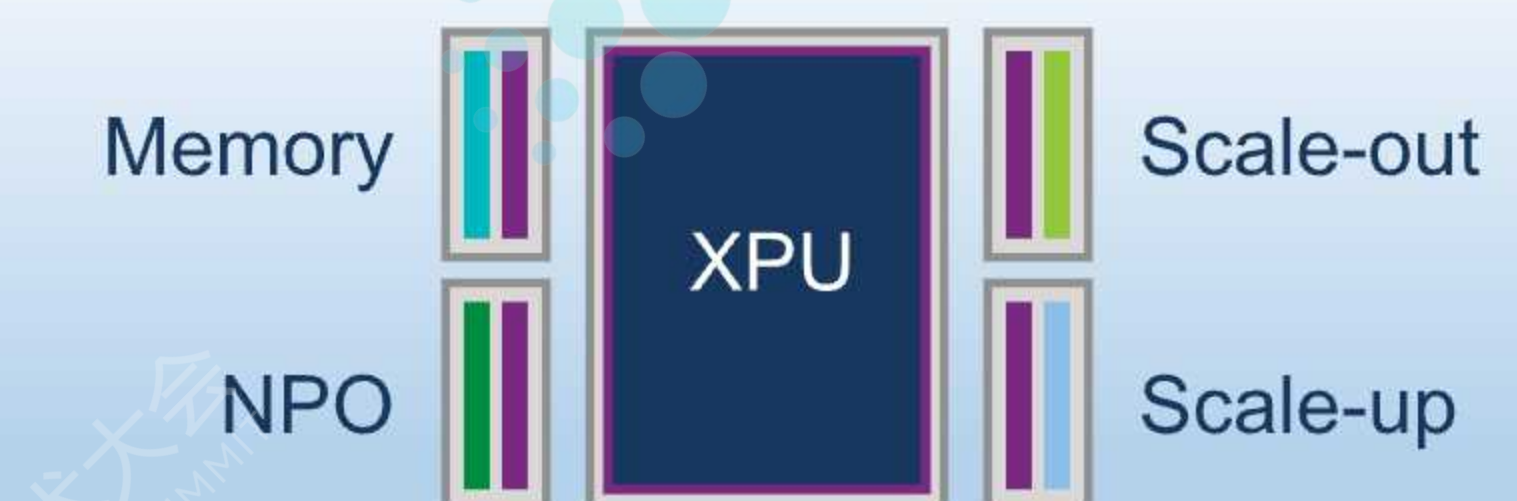
Active Electrical Cables



ZeroFlap Transceivers



OmniConnect
Gearboxes



Active LED Cables



PILOT Debug &
Telemetry Software





THANKS

For more information, please visit www.credosemi.com or email sales@credosemi.com