The HiWire Consortium Joins Forces with OCP

Standardizing Active Electrical Cables (AECs)

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Connect. Collaborate. Accelerate.

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Presenters

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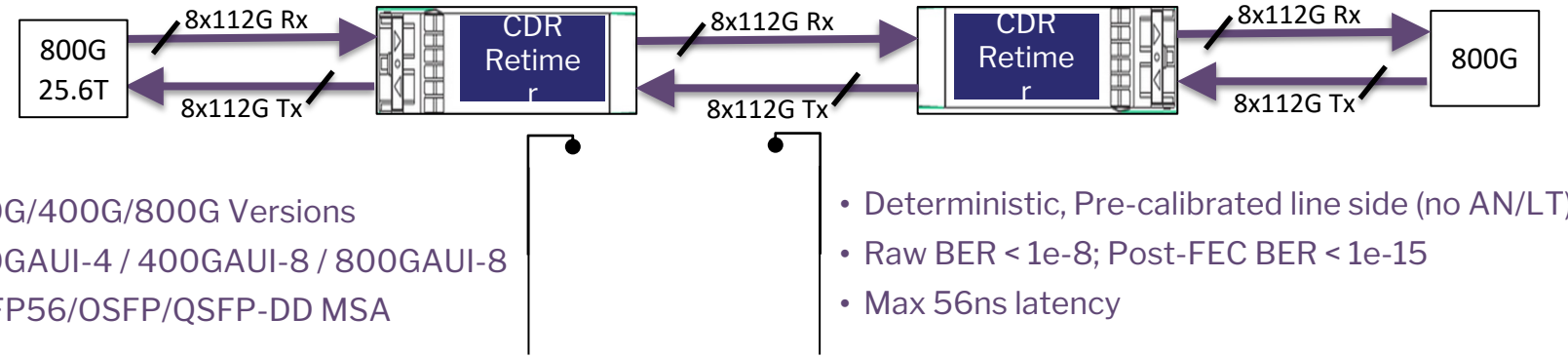
Agenda

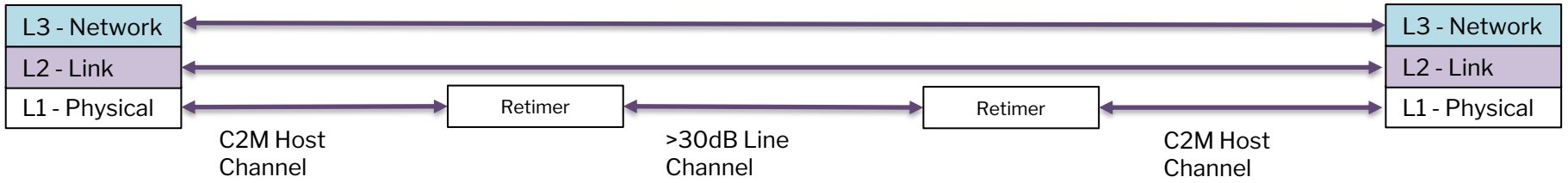
- Why AECs Now?
- AEC Use cases
  - NIC – TOR Connectivity
  - Distributed, Disaggregated Chassis (DDC)
- HiWire Consortium Background and Deliverables
- Challenge Ahead : 800G / 1.6T and beyond
- Call to Action

AEC Introduction



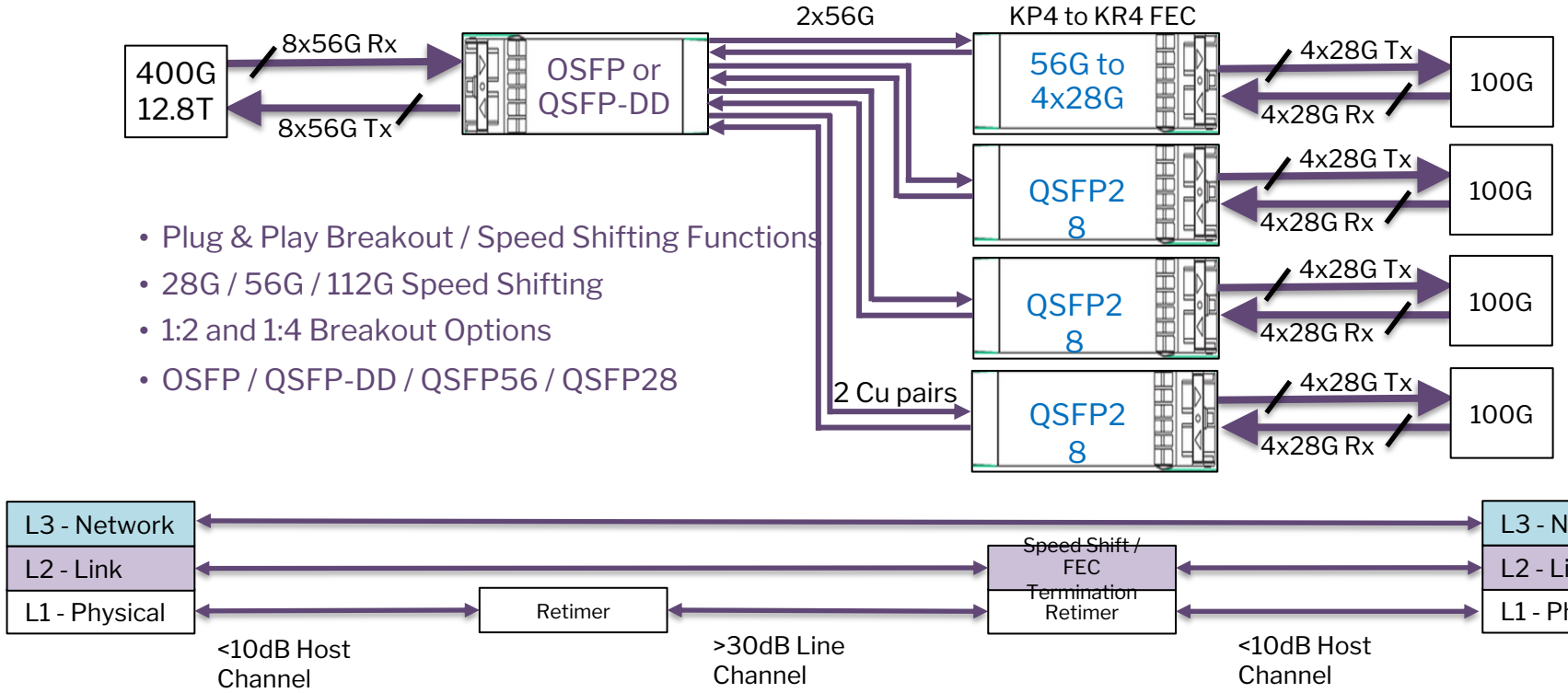
- 200G/400G/800G Versions
- 200GAUI-4 / 400GAUI-8 / 800GAUI-8
- QSFP56/OSFP/QSFP-DD MSA

- Deterministic, Pre-calibrated line side (no AN/LT)
- Raw BER < 1e-8; Post-FEC BER < 1e-15
- Max 56ns latency



AEC Introduction

FEC and Gearbox Functions Integrated in the Cable



- Plug & Play Breakout / Speed Shifting Functions
- 28G / 56G / 112G Speed Shifting
- 1:2 and 1:4 Breakout Options
- OSFP / QSFP-DD / QSFP56 / QSFP28

Why now? DACs are running aground..

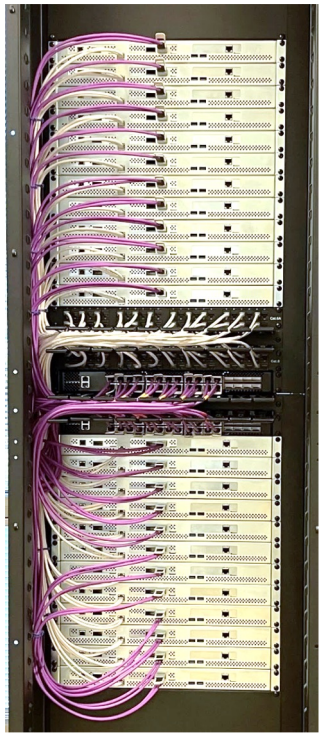
Speed Lane / Cable	Max Reach	AWG / OD @ 2.5m	Cable Volume Ratio	% Ports Supporting solvable w/DAC	% HSDC Plugged with DAC
1Gb / 1Gb	100m	24 / 5.5mm	100%	100%	~100%
10Gb / 40Gb	10m	30 / 4.5 mm	67%	100%	~70%
28Gb / 100Gb	5m	30 / 6.6 mm	144%	100%	~55%
56Gb / 400Gb	3m	26 / 9.4mm	292%	100%	~35%
112Gb / 800Gb	2m	25 / 12.6mm 2m max	524%	?	?

HSDC front panel interconnect density is increasing rapidly
DAC volume / pliability and thickness is reducing utility
Optics are high power / high cost and reduced reliability
AECs offer 75% reduction in DAC volume (back to Cat6e level @ 800G)
AECs offer 50% less power and cost than Optics
AECs maintain DAC MTBF levels (100M hrs+)

AEC Use Cases

Distributed Disaggregated Chassis (DDC) Applications

NIC (Server) to TOR



NIC – TOR AEC Adoption

HSDC NIC-TOR cable densities start to exceed 100 connections/rack

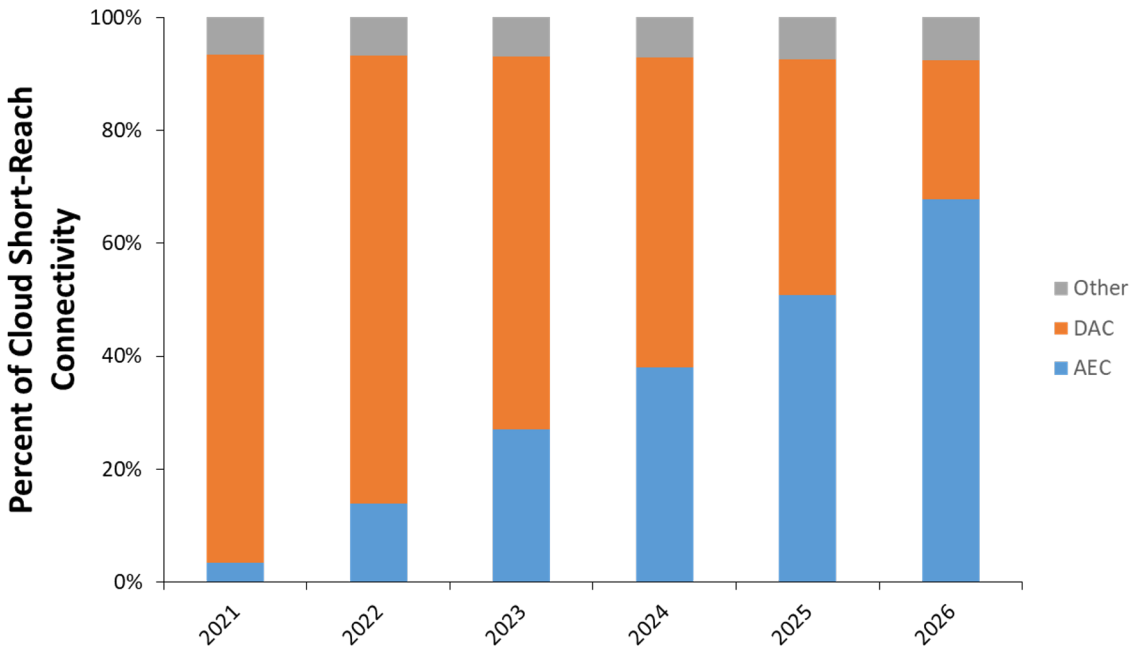
At 56G and 112G/lane, DAC thickness and pliability becomes a blocking issue for HSDC interconnect

AEC enable a return to ~Cat6e thickness (6.8mm)

AECs also enable advanced digital functions

- DualTOR Active/Standby
- Line rate encryption / decryption
- Advanced control and telemetry

AECs grow to 75% of HSDC DAC NIC-TOR Connections by 2026



Source : 650 Group, Mar, 2022

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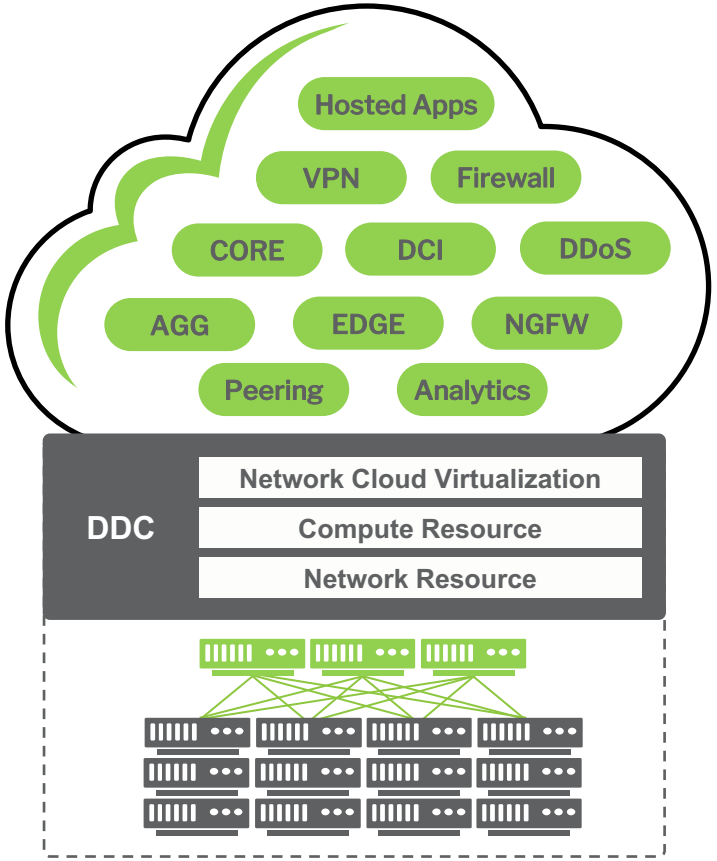
Introduction to DDC

- OCP contributed specs
- NOS & Chassis distribution
- White-boxes + cabling
- Ecosystem breaks vendor lock



Building networks like cloud
Scale / Economics / Innovation

NETWORKING

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350Tb DDC Router from OCP'21

CREDO we connect. DRIVENETS ufiSpace

350Tb Core Router
- 24xJericho2C+ Whitebox Network Processors
- 20xRamon Whitebox Network Fabric
- DriveNets Network Management Software

960 x 400G LP AEC Fabric
- Left Side HPC-style 800m / 32AWG
- Right Side Tray Style 1.6km / 30AWG

DACs – not an option, no space
AOCs – not an option no budget
- 2x as much fabric power / +20% cluster power
- 2x as much cost
- 100x worse MTBF – much higher TCO

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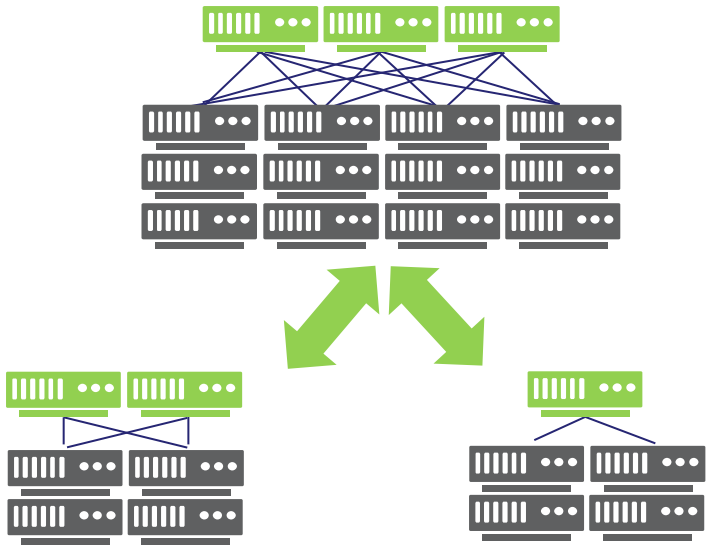
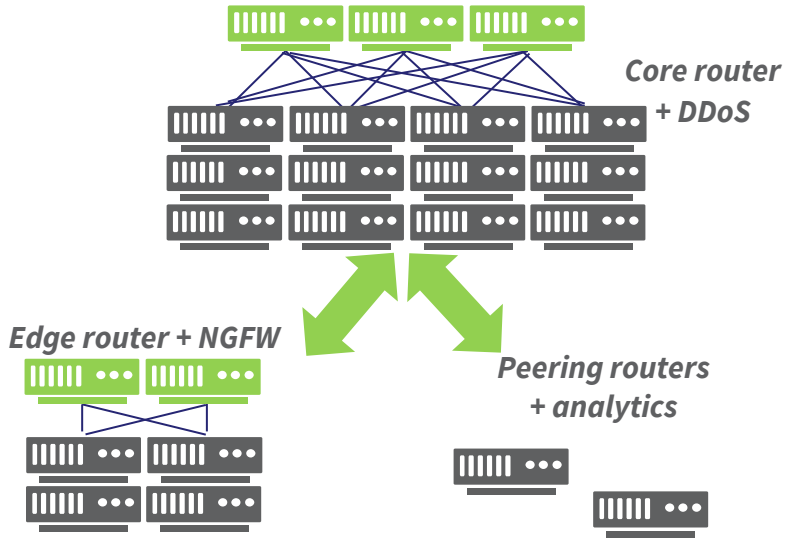
Reducing Embedded Carbon

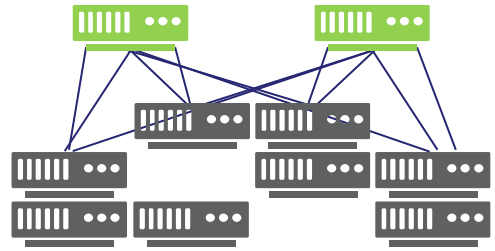
Changing scale



multiple functions



Fits any location



DDC hardware lives longer and does more

HiWire Consortium joins Forces with OCP

- Credo founded the HiWire Consortium in 2019
- Objective : USB-IF for AECs
  - Specific cable implementation
  - Validation test specification
  - Enable 3rd party lab for validatio
  - Mark for certification
- 46 members produced AEC specification v1.0 – contributed to OCP
- Further work will be inside OCP

Info at : https://www.hiwire.org/

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Challenge Ahead : 800G/1.6T+

- A single chip – module setting may not be sufficient to cover all host to active pluggable cases at 112G/lane
- C2M Interface adds options
  - Already have short/long channel in IEEE 802.ck standard
  - Proposals to add
    - Link training to C2M (CMIS-LT or in-band)
    - Non-standard hosts (more than traditional 16dB C2M link budget)
    - New firmware features (hitless upgrades, local/remote control, event logging)
    - Additional telemetry (mission mode FEC histogram, etc.)
- AEC Project charter is to evaluate these options, solicit feedback and create a reference implementation for 800G/1.6T AECs

Call to Action

- Join us and help develop the ecosystem of Plug & Play AECs
  - First call : 6PM PDT, May 17th, https://meet.goto.com/05/ocp-interconnects-sub-project-call
- Key Activities
  - Add additional SKUs / speeds into the AEC specification
    - 200G / 400G baseline (56G/lane) is in place
    - 400G – 4x100G with gearboing (28G/lane) is in place
    - 112G/lane (1, 2, 4, 8 and 16 lanes) needs to be done
    - 112G/lane bitmuxing needs to be defined and done
  - Develop and ratify a test specification
  - Discuss 3rd party lab enablement