Optimizing Optical Architectures for Cloud and AI Networks

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July 2026

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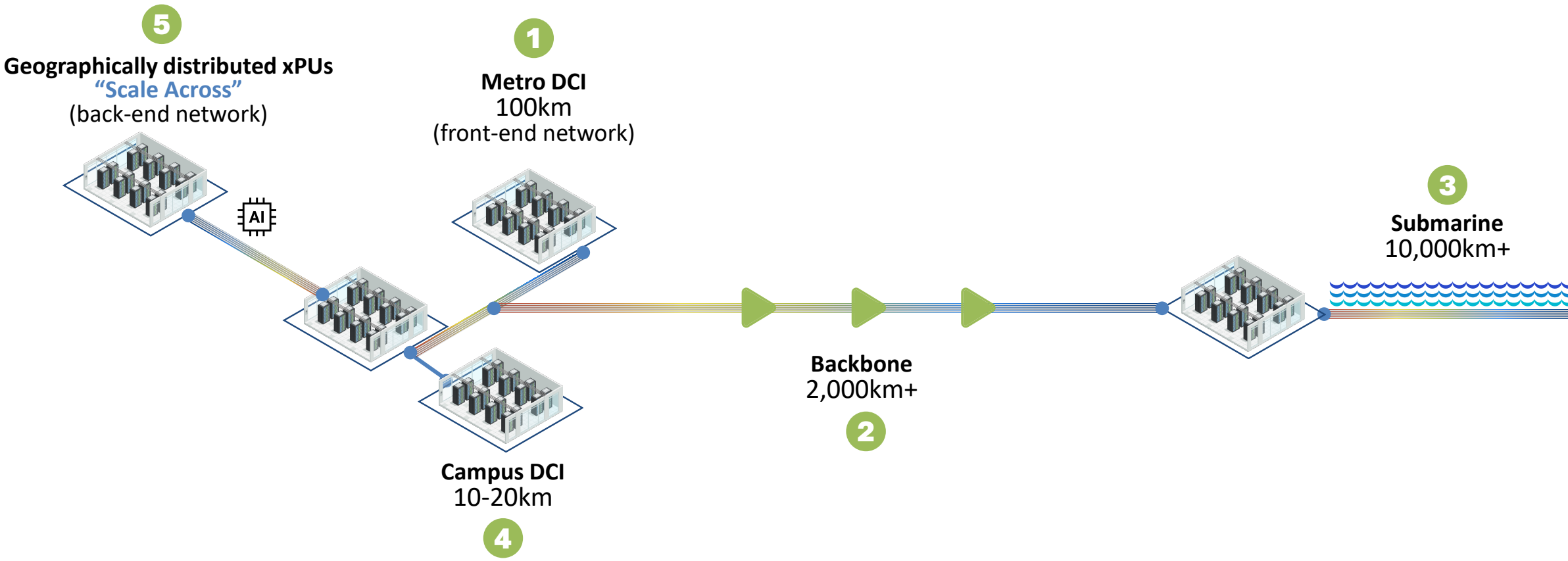
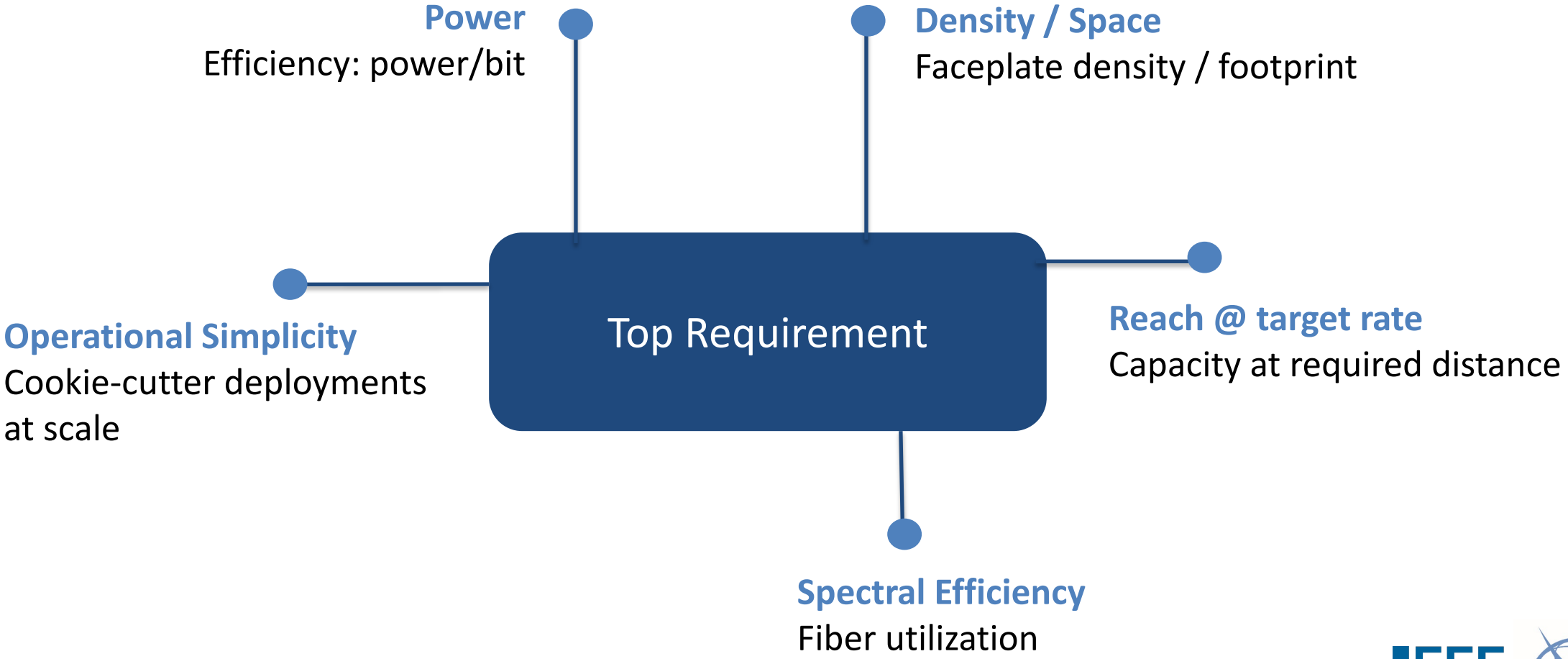
Enabling AI Scale with the Right Optical Architecture

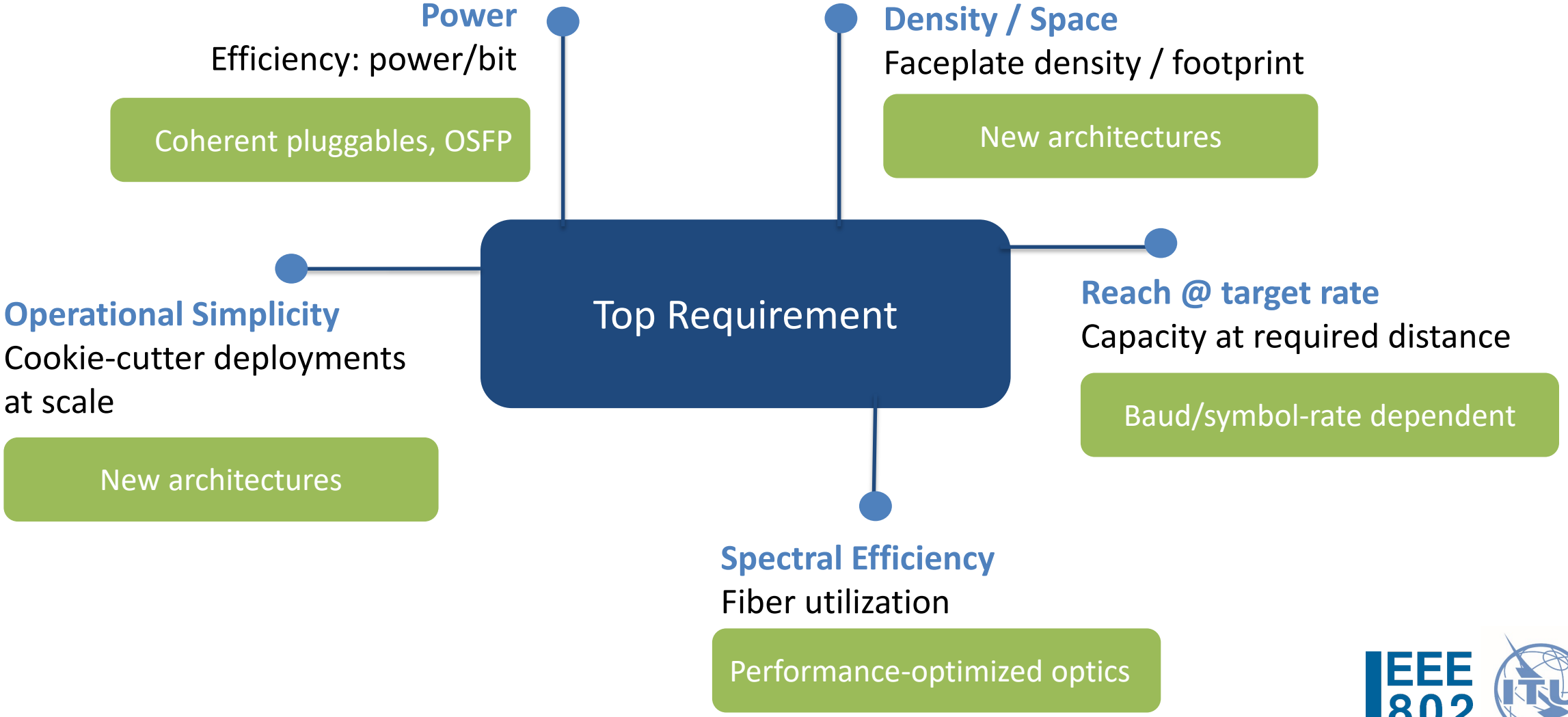


DCI Is Not One Market: Different Requirements, Different Solutions

Different priorities are driving different DCI designs

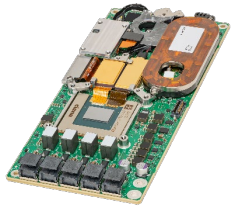


Different priorities are driving different DCI designs



Optimization in Action: A Metro DCI Example

800G
Coherent Pluggable Transceiver



1.6 Tb/s
Performance Transponder

	800G Coherent Pluggable Transceiver	1.6 Tb/s Performance Transponder
Technology	WaveLogic 6 Nano	WaveLogic 6 Extreme
Capacity	51.2 Tb/s	76.8 Tb/s (+50%)
Channels	64 x 800 Gb/s (150GHz)	48 x 1.6 Tb/s (200GHz)

Power & space optimization → Pluggables

Evolution: 1600ZR, 1600ZR+, 1600G Coherent-Lite, …

Spectral Efficiency Optimization → Transponders

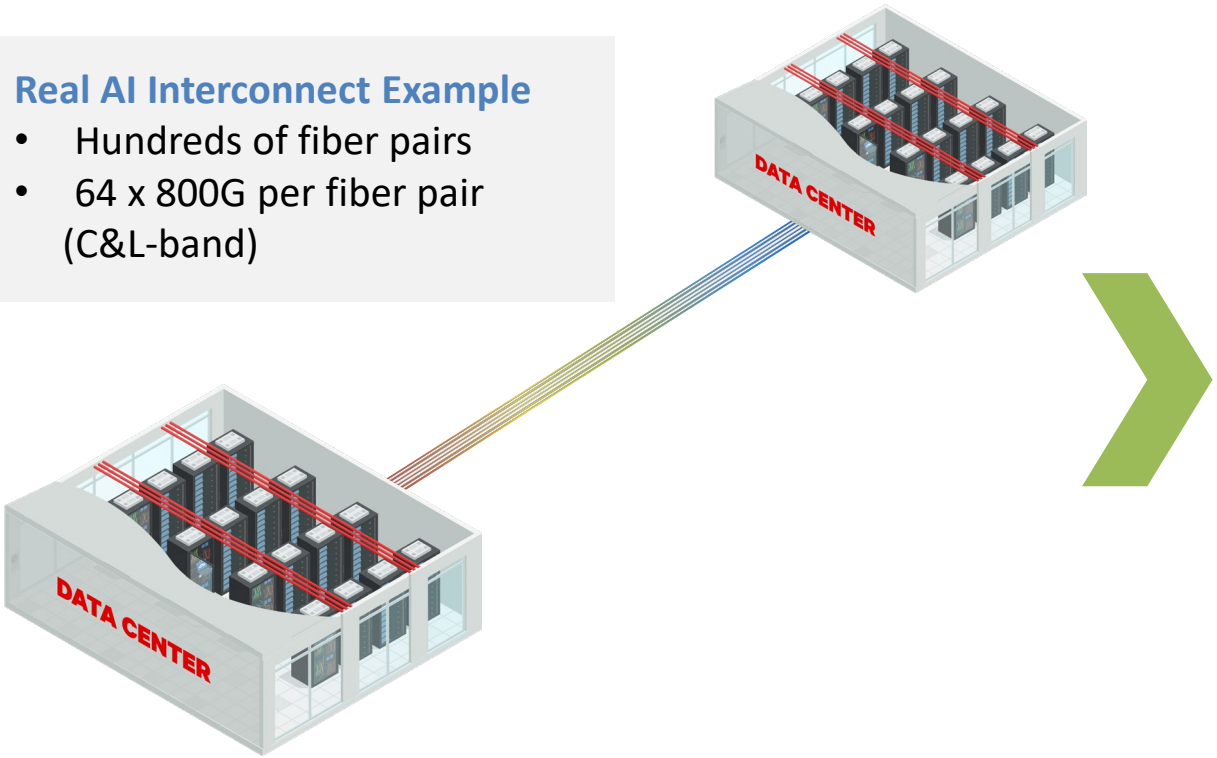
Evolution: Network sensing, 300/400GHz designs

The rise of Scale Across networking is here

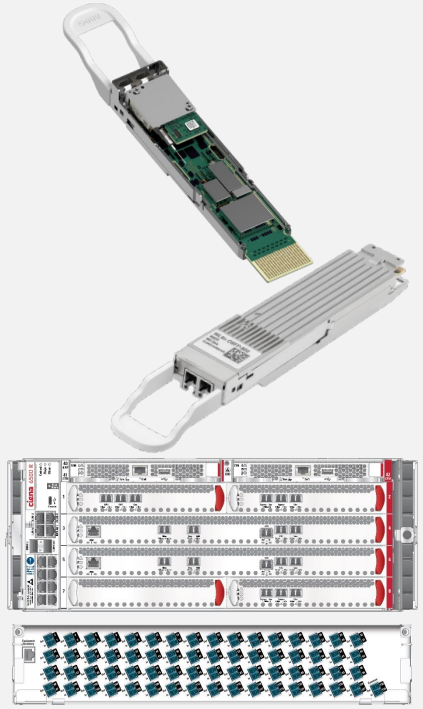
Optimized for simplicity, density, and massive scale

Real AI Interconnect Example

- Hundreds of fiber pairs
- 64 x 800G per fiber pair (C&L-band)



THE SOLUTION



Coherent Pluggables

- WaveLogic 6 Nano 800G ZR+ with interoperable PCS
- C- and L-Band variants

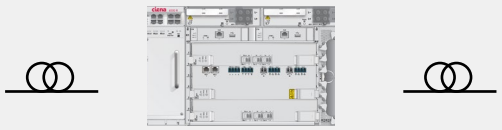
RLS
C&L-Band line system
Designed to data center specifications

Driving simultaneous innovation in coherent pluggables and photonic line systems

Redefining photonic infrastructure for AI scale

Line amp sites TODAY
4 rails/rack, 16 rails/hut
All capacity within one hut

4 rails / rack
1 hut



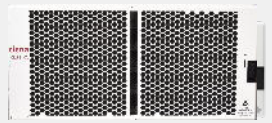
20 Pb/s AI Network
Using conventional line system designs → 22 huts required

4 rails / rack
22 hut

32x
density improvement!

Step level order in density and power efficiency with multi-rail photonics

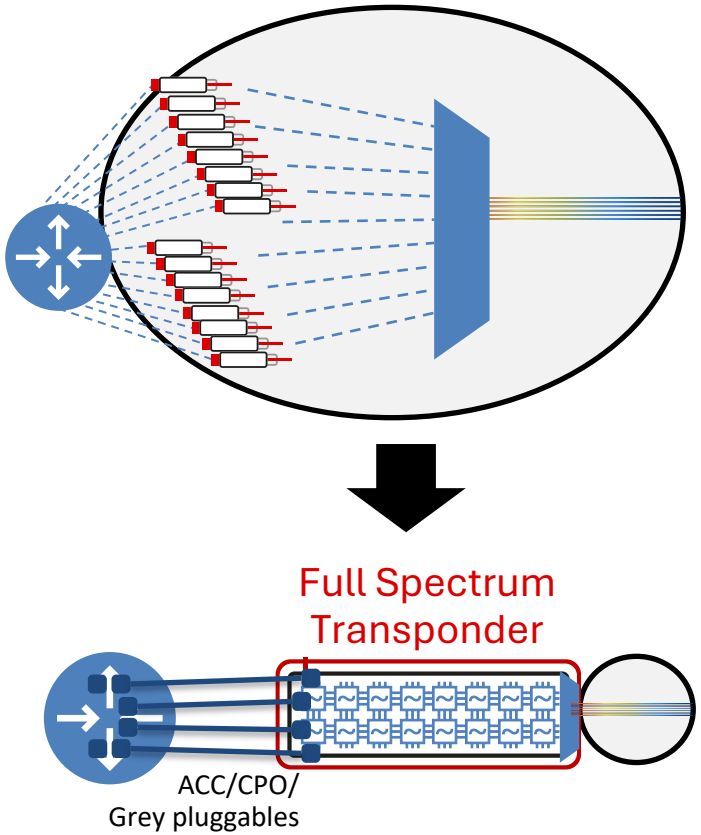
Ex: RLS Hyper-Rail
128 rails / rack
1 hut



Multi-rail photonics enable AI-scale capacity with a fraction of the infrastructure

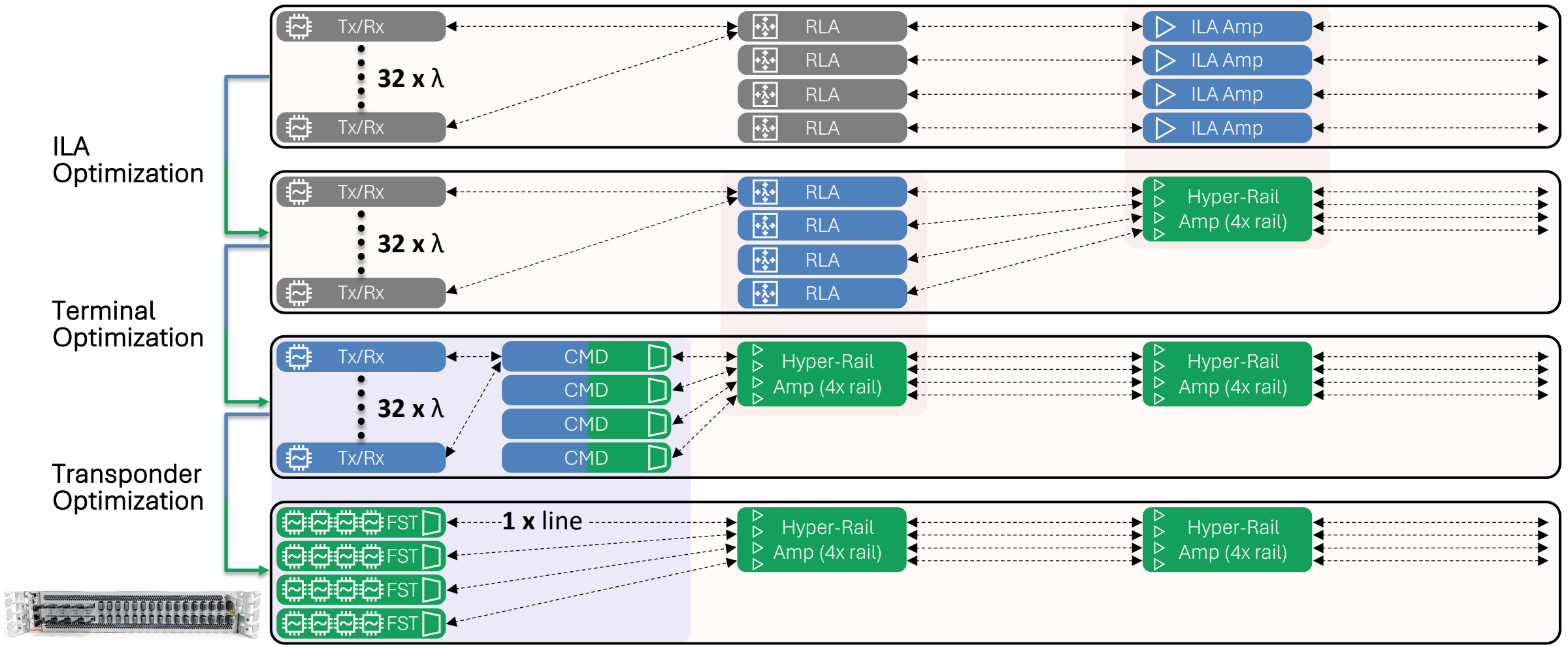
From Lighting Wavelengths to Lighting Full Fibers

- Today: wavelength-by-wavelength deployment
  - 128 x 400G x 2 pluggables per fiber pair
  - 64 x 800G x 2 pluggables per fiber pair
- Scaling this model for 10s-100s fiber deployments becomes operationally complex.
- **Full spectrum transponder**
  - Lights the entire fiber at once
  - Returns to grey optics and external transponders
  - Reduces reliance on DWDM expertise
  - Enables cookie-cutter deployments



Optimizing for Deployment Velocity Favors Full-Fiber Architectures

The Evolution toward Full Fiber Architectures



Enables repeatable, cookie-cutter deployments at AI scale

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The New Limits of Optical Scaling: Density and Power

Router capacity scaling

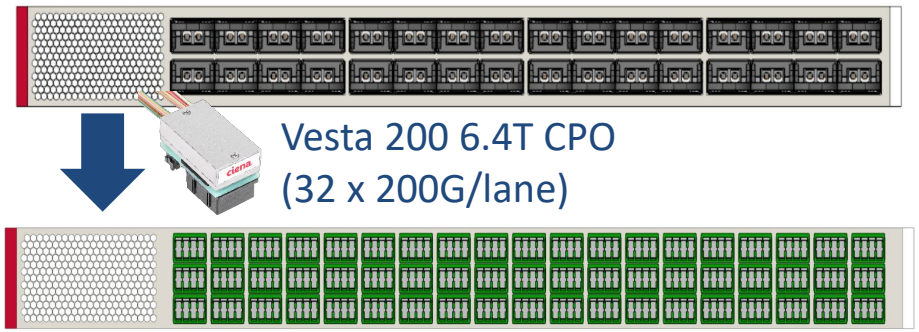
- 51.2 → 102.4 → 204.8 Tb/s
- Faceplate density limited to **32 OSFP/OU**

Physical limits emerging

- Pluggable power approaching **air-cooling limits**

Power and faceplate density are the new scaling limits.

Co-packaged optics (CPO)
- Higher density
- Lower electrical power



Return to grey optics and transponders

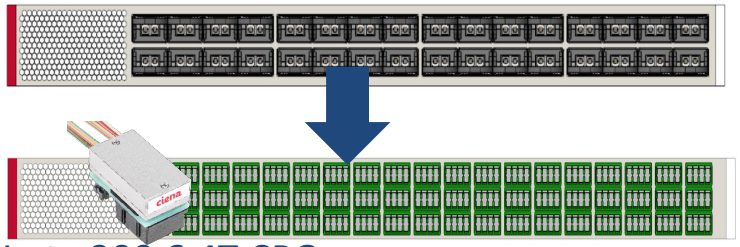
Direct-to-plug liquid cooling
- Enables higher-power pluggables
- Maintains the benefits of pluggables

Requires liquid cooling infrastructure

Optical Interconnect Evolution

IMDD evolution

Co-packaged optics (CPO)
- Higher density
- Lower electrical power

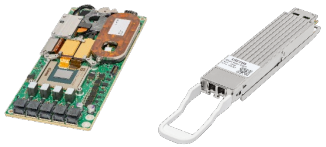


Vesta 200 6.4T CPO
(32 x 200G/lane)

Coherent Evolution

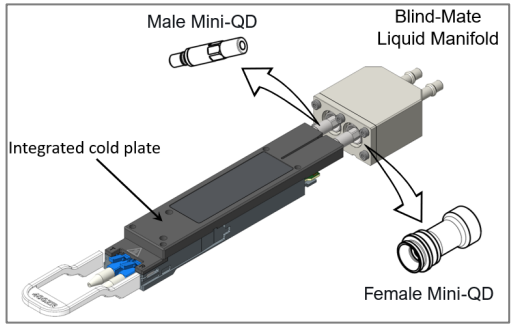
Reg/LH	Metro	Campus
800G	800G	
1.6T	1.6T	1.6T

Expanding to more applications



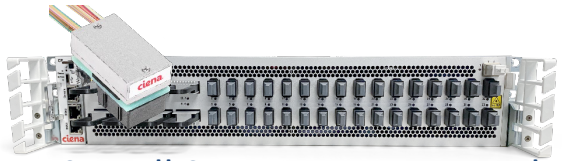
Liquid Cooling

Direct-to-plug liquid cooling
- Enables higher-power pluggables and systems



AI requirements are causing coherent, IMDD, and thermal innovation to converge into entirely new classes of optical systems

12.8T XPO (8 x 1.6T)



51.2T Full Spectrum Transponder,
with CPO clients

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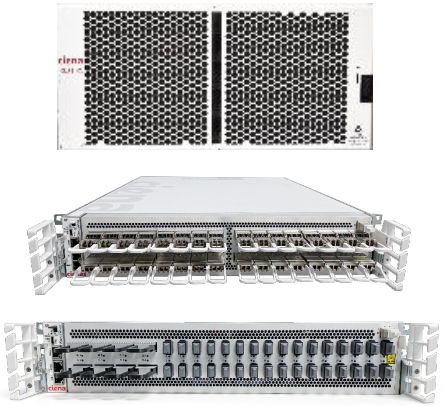
Different Constraints Drive Different Optical Architectures

Power Efficiency	Spectral Efficiency	Deployment Velocity	Thermal/density limits
Coherent Pluggables	Performance Transponders	Full-Fiber Systems	CPO / Liquid Cooling



The future of optical networking is not one architecture—it is the coexistence of many.

Thank you

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