The evolution of cloud data center connectivity

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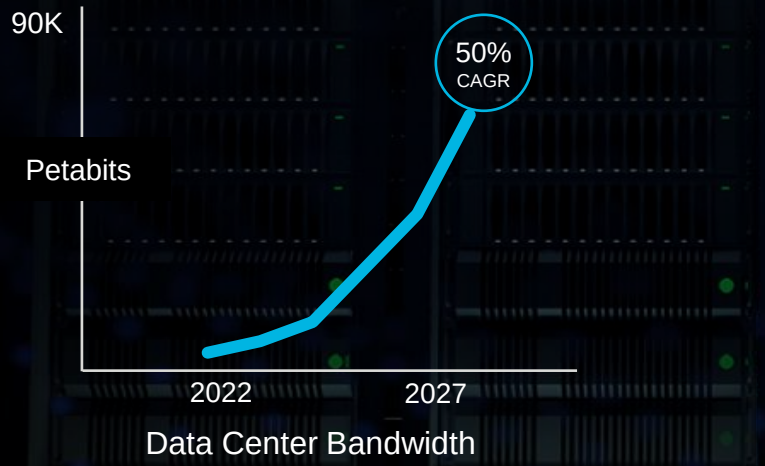
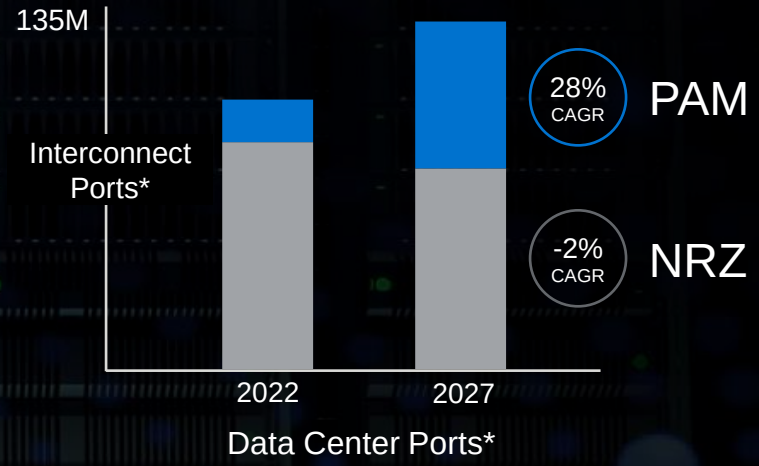
Bandwidth growth drives infrastructure expansion

More bandwidth



PAM accelerating



Source: 650 Group

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*Ethernet switch ports
PAM is port speeds of 200Gbps and greater
NRZ is port speeds of 100Gbps and lower

What keeps cloud operators up at night?

24x7, 99.999% availability

Downtime = significant revenue loss

Massive scale

1000s data centers worldwide

100s added every year

Reliability = Revenue and Reputation

Source: Analyst estimates

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What do cloud operators want?

Bandwidth

- Higher speeds
- Time to market
- Lower cost and power per bit

Pluggable, multi-vendor ecosystem

Scale

- Plug and play
- Backward / forward compatibility
- Asynchronous upgrades

Reliability

- Serviceability
- Diagnostics and telemetry
- Resiliency

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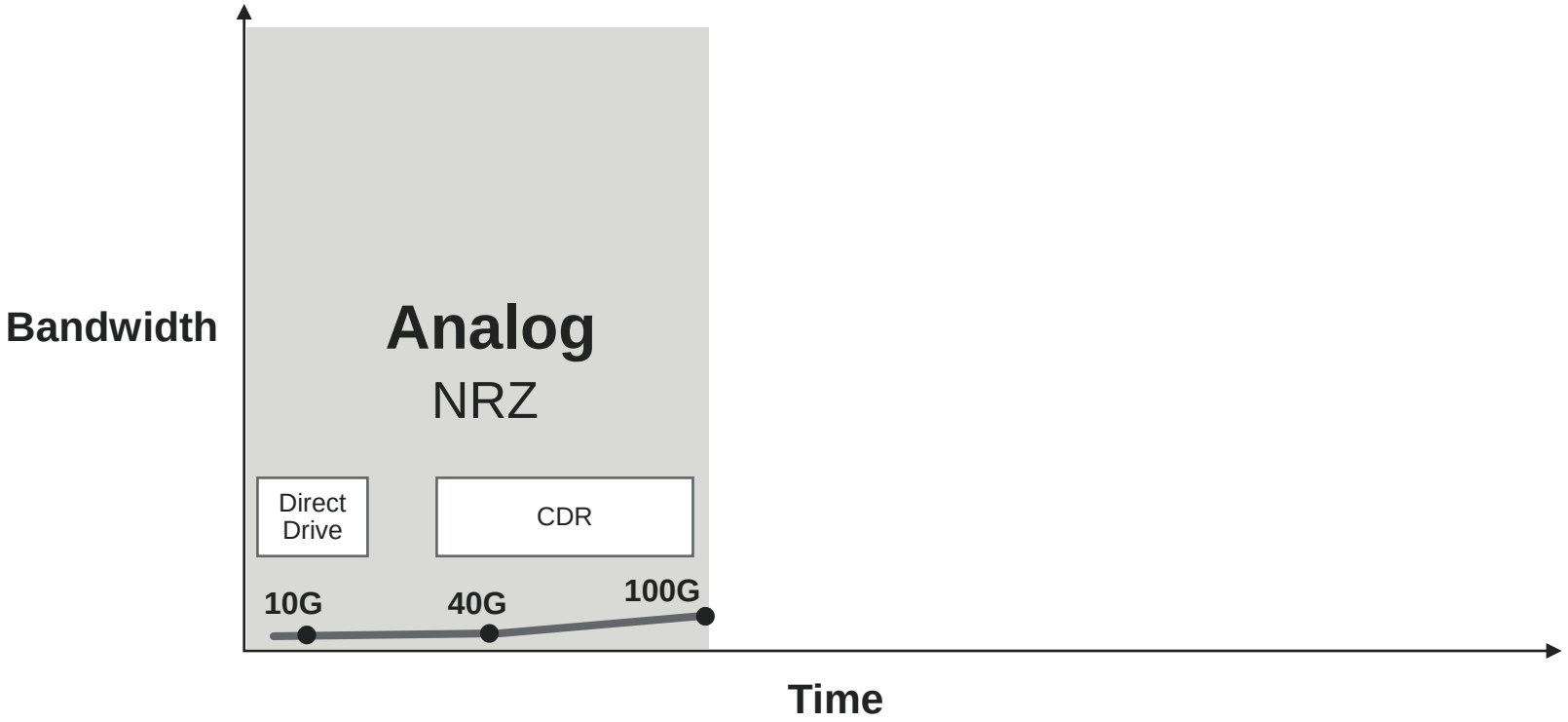
Analog hits scale wall



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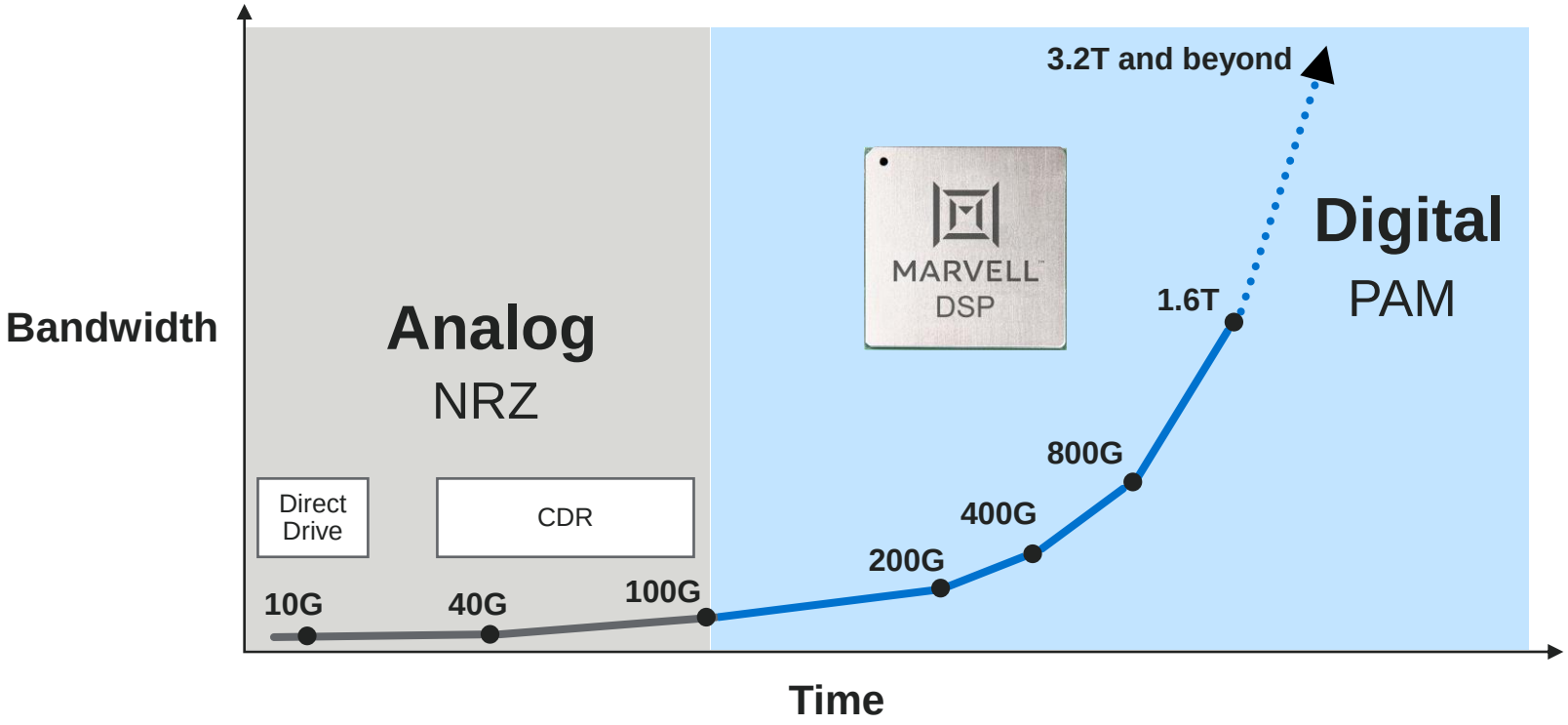
DSP enables cloud data centers at scale



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Who needs the DSP…

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OFC DSP essential to scale bandwidth reliably

"Linear drive technology still needs to be validated. **Retimed DSP pluggables is the only proven way** forward for the industry."

LightCounting

"LDD vs. DSP; Pluggables Have the Ball: LDD to potentially play a limited role in some future architectures but **see pluggable PAM4 DSP dominating for the foreseeable future.**"

Oppenheimer

"The idea that somebody with such intimacy on network requirements would **recklessly discard the DSP… seems nonsensical.**"

fibeReality

"Linear drive interface (LDI) generated a lot of buzz at OFC……most of the networking engineers we spoke to agreed that this technology has significant limitations…not plug and play**…not likely to be a competitive threat to Marvell's DSP-based architecture**"

JP Morgan

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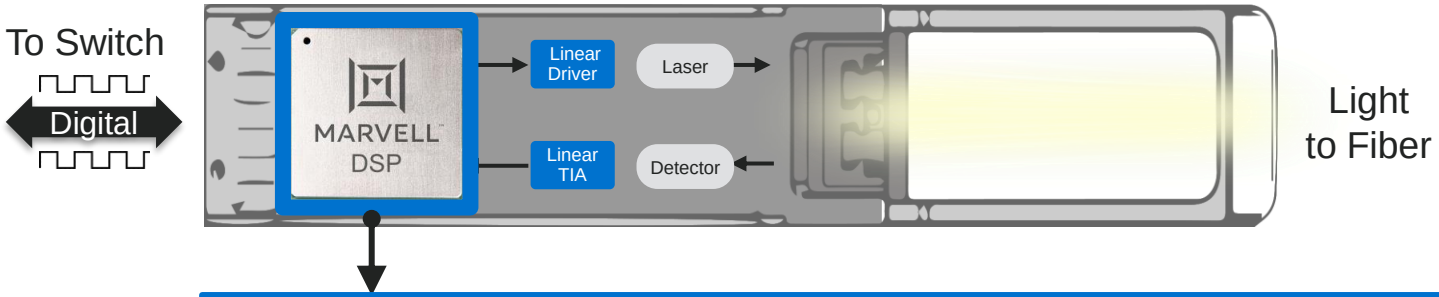
Why is DSP essential?



Digital SerDes	→ Compensates electro-optical impairments
Error correction	→ Resolves component variations
Telemetry	→ Enhances network monitoring and reliability
Gearbox	→ Enables heterogenous network

10s of millions Marvell DSPs deployed

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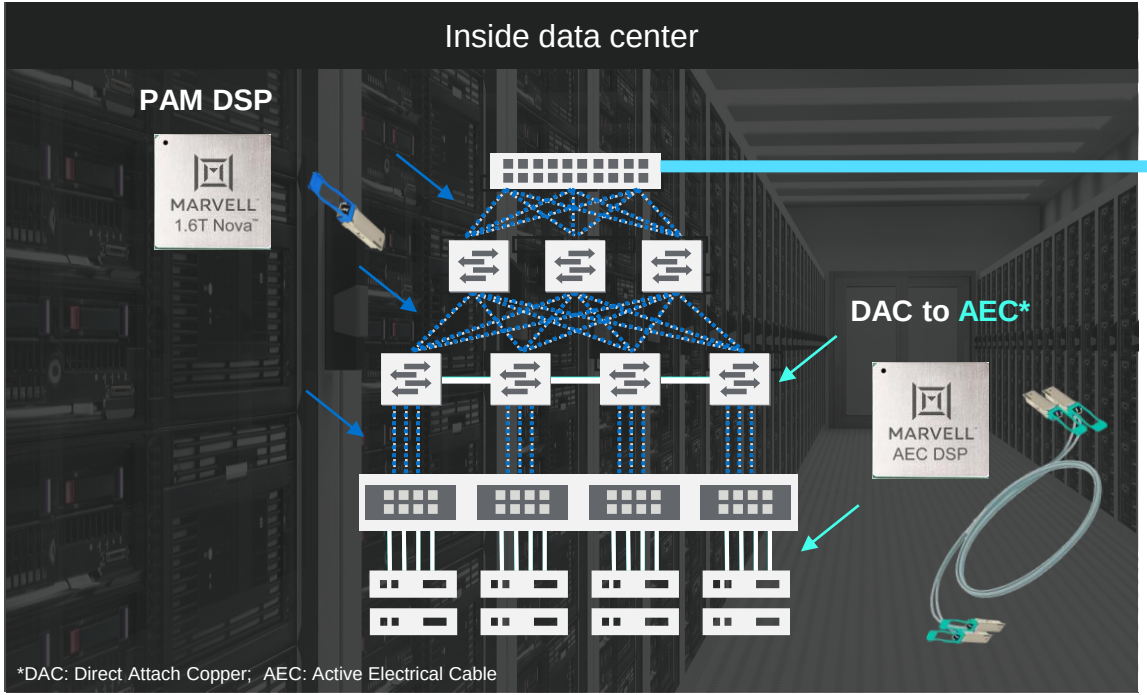
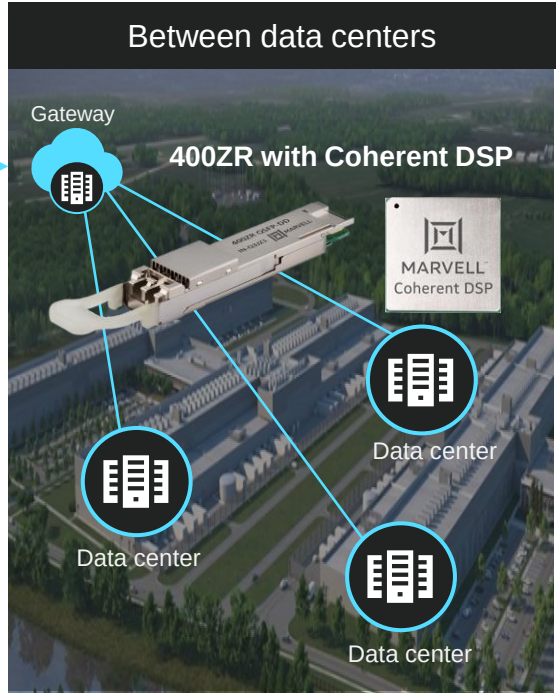
Demand for DSP increases in **future** data centers

Increasing data rates

Transition to AEC

Rise of regional cloud





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Demand for DSP increases with **AI/ML**

- 2x speed every 18-24 months
- Fast deployment
- 24x7 availability, no downtime

Source: ChatGPT, Medium, Towards Data Science

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AI/ML
bandwidth explosion

500 X

100 trillion
Training parameters

175 billion
Training parameters

GPT-3
Text only

GPT-4
Text + images, video

Expanding DSP opportunity ahead

More use cases → AI/ML, ZR, AEC

More DSPs

Early stages of adoption

More customers to come

Exponential data growth

Higher speeds, ASP uplift

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Key takeaways

1. Growing bandwidth creates scale and reliability challenges
2. Pluggable DSP ecosystem essential
3. AI/ML massively accelerating DSP adoption
4. Expanding DSP opportunity ahead

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Q&A