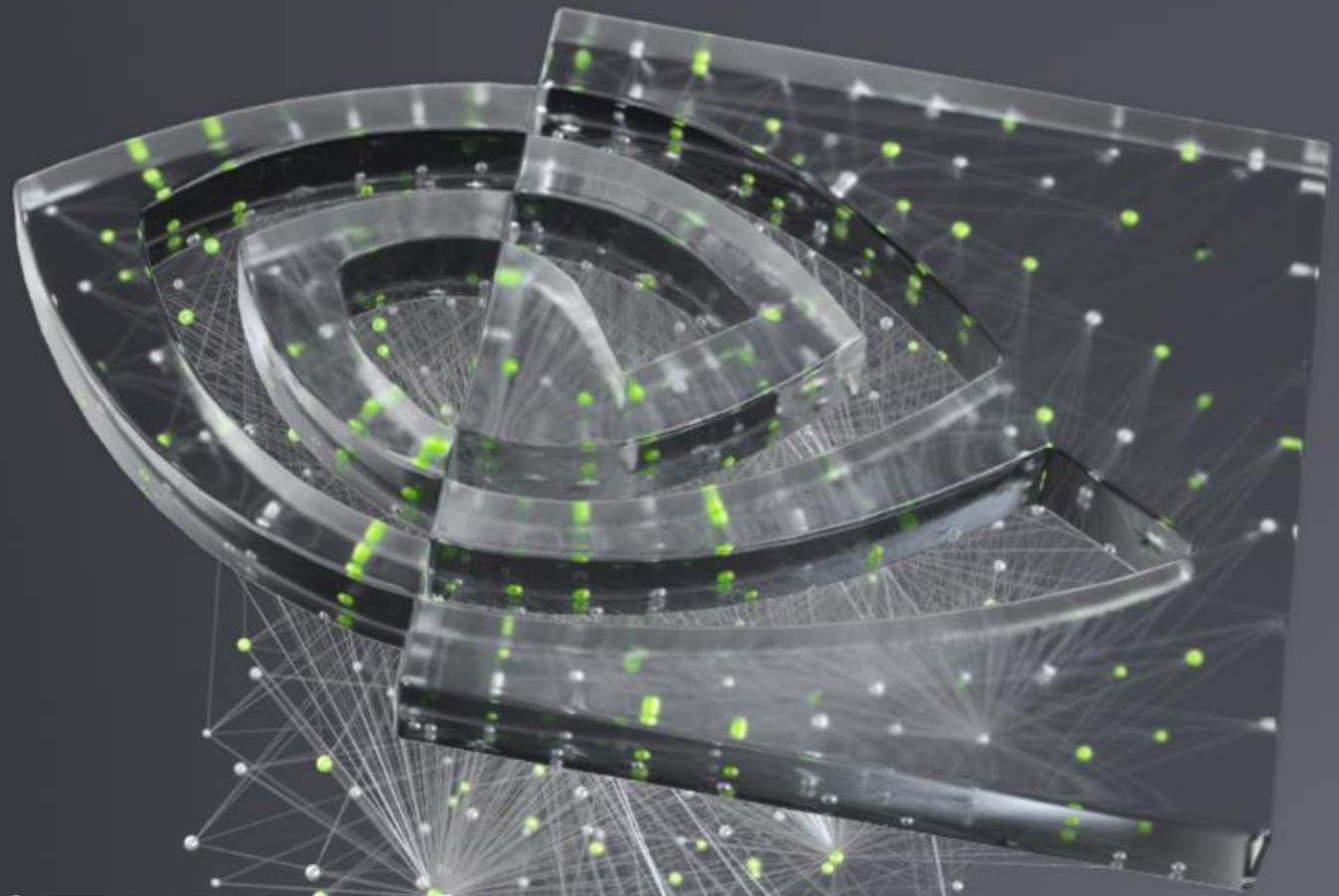


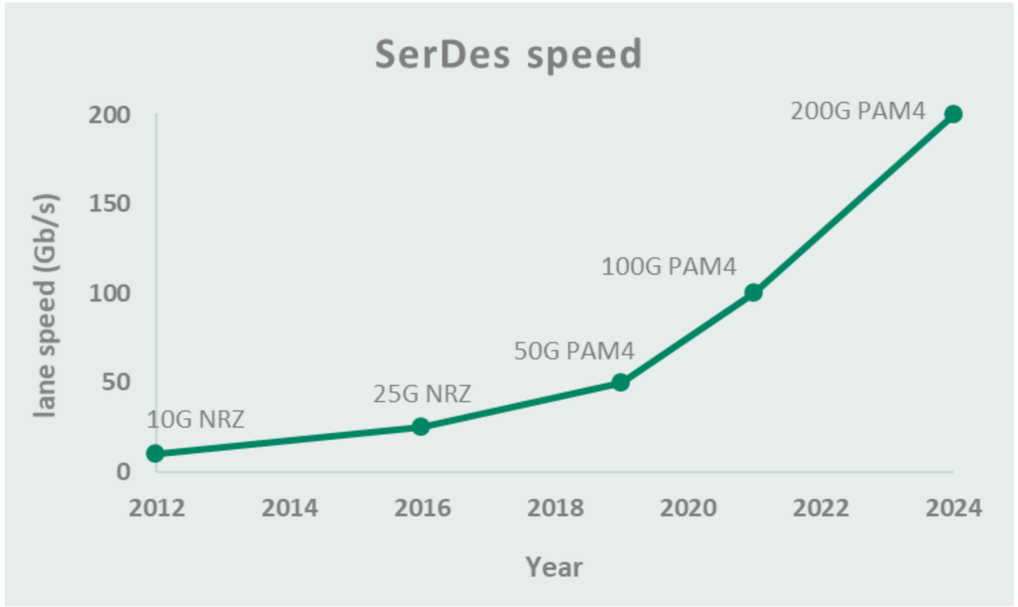
CHALLENGES AND PATHWAYS BEYOND 400G OPTICS

Paraskevas Bakopoulos, EPIC online technology meeting, 21 April 2021

SCALING TRENDS

Year	Aggregate bandwidth (Tb/s)	Number of I/O lanes	Per lane rate (Gb/s)
2011	0.64	64	10
2012	1.28	128	10
2014	3.2	128	25
2016	6.4	256	25
2018	12.8	256	50
2020	25.6	256	100
2022	51.2	512	100

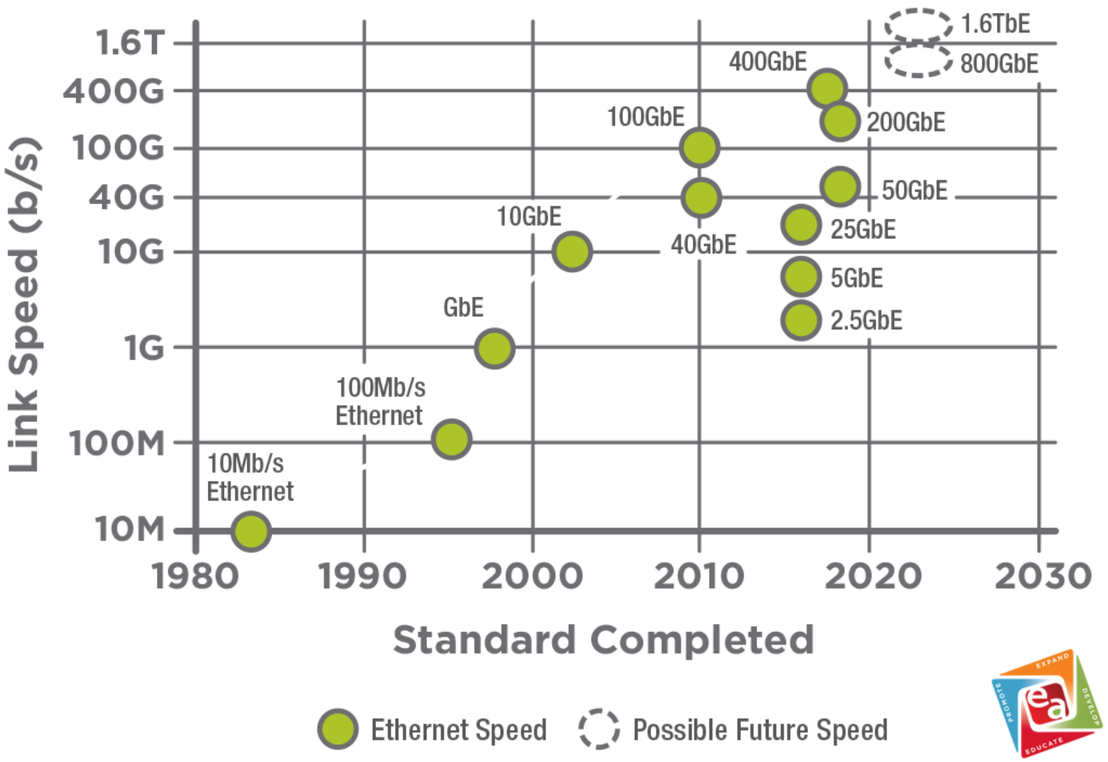
Adapted from X. Zhou et al., Optical Fiber Technology 44 (2018) 61-68

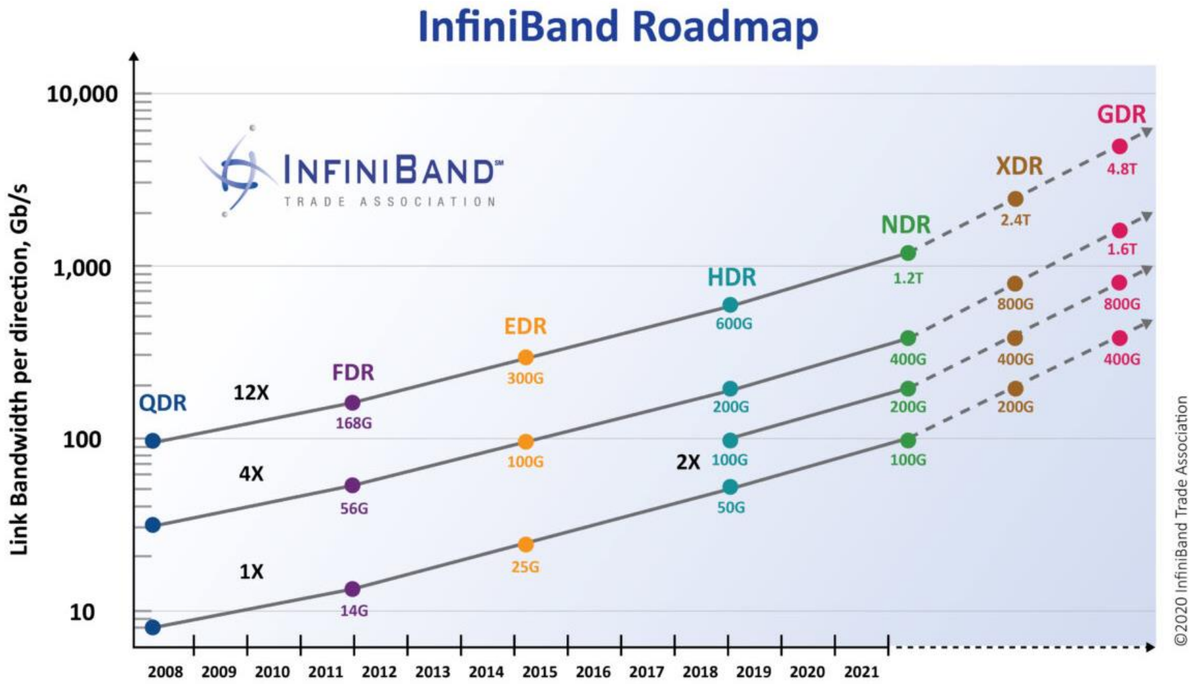


- DC bandwidth demand grows exponentially, >70% traffic stays in the datacenter
- Switch scale-up and scale-out
- 100G SerDes enables 800G transceivers
- 200G SerDes will enable 1.6 Tb/s

WHAT IS COMING AFTER 400G?

Ethernet and InfiniBand roadmaps

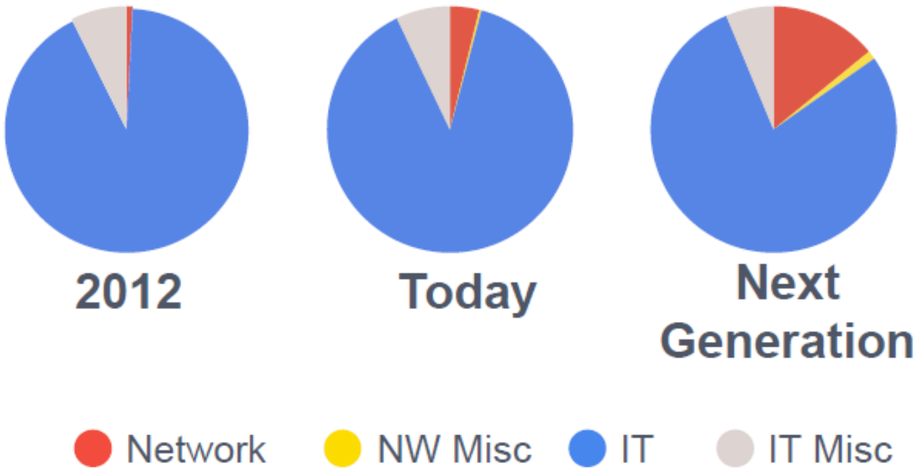




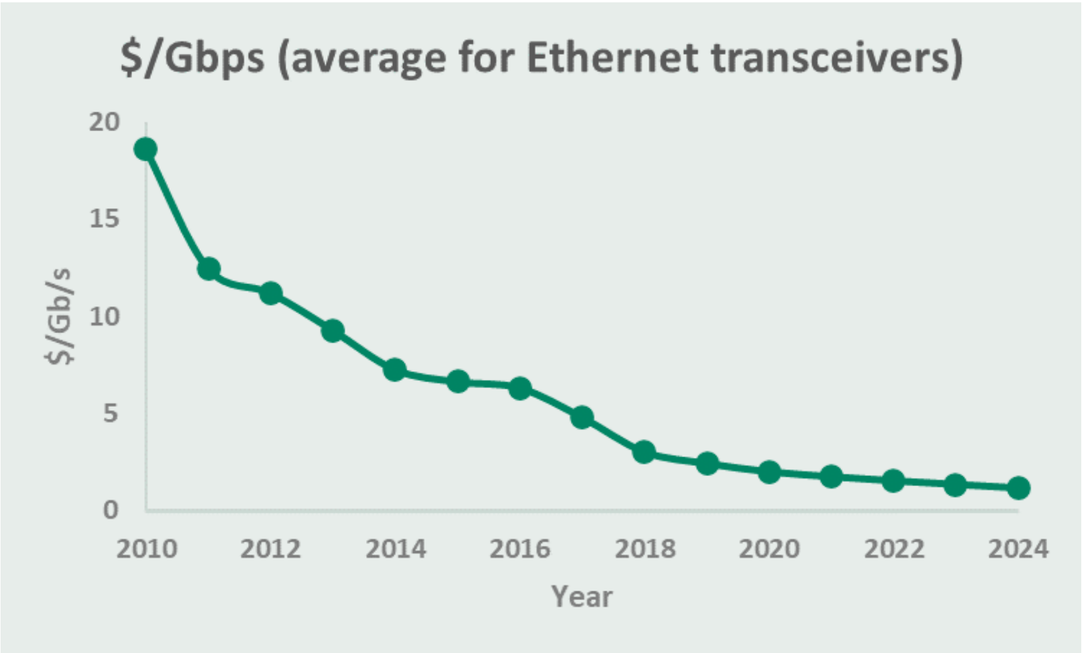
- Diverging speeds for diverging customer needs
- Next speed range from 800 Gb/s – 1.6 Tb/s

CHALLENGES BEYOND 400G

Power, cost



Source: Facebook



- Network power is taking up valuable system resources
- New solutions need to reach (at least) parity in cost/bit
- 400G flexibility still needed (diversity in medium interfaces, reaches)

EFFORTS BEYOND 400G

standardization efforts for next generation and paths beyond

IEEE

IEEE 802.3
Beyond 400 Gb/s
Ethernet Study Group

InfiniBand™ TRADE ASSOCIATION

Ethernet Technology Consortium

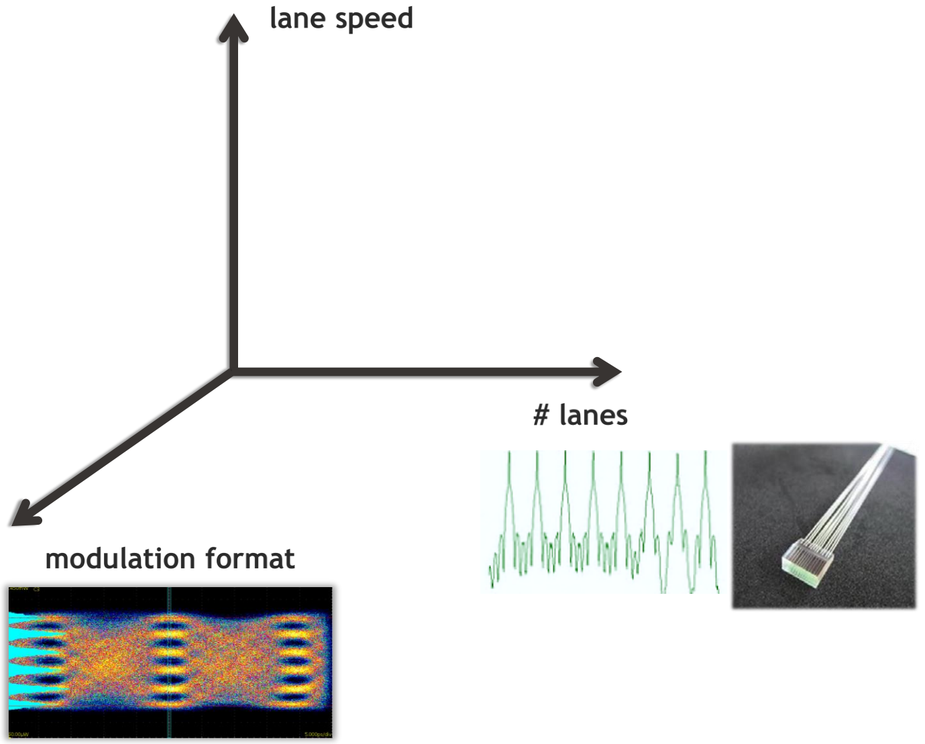
800G Pluggable MULTI-SOURCE AGREEMENT

OIF CEI-224G

OIF 800G COHERENT

QSFP-DD800

OSFP



- Evaluate all directions against challenges & expectations

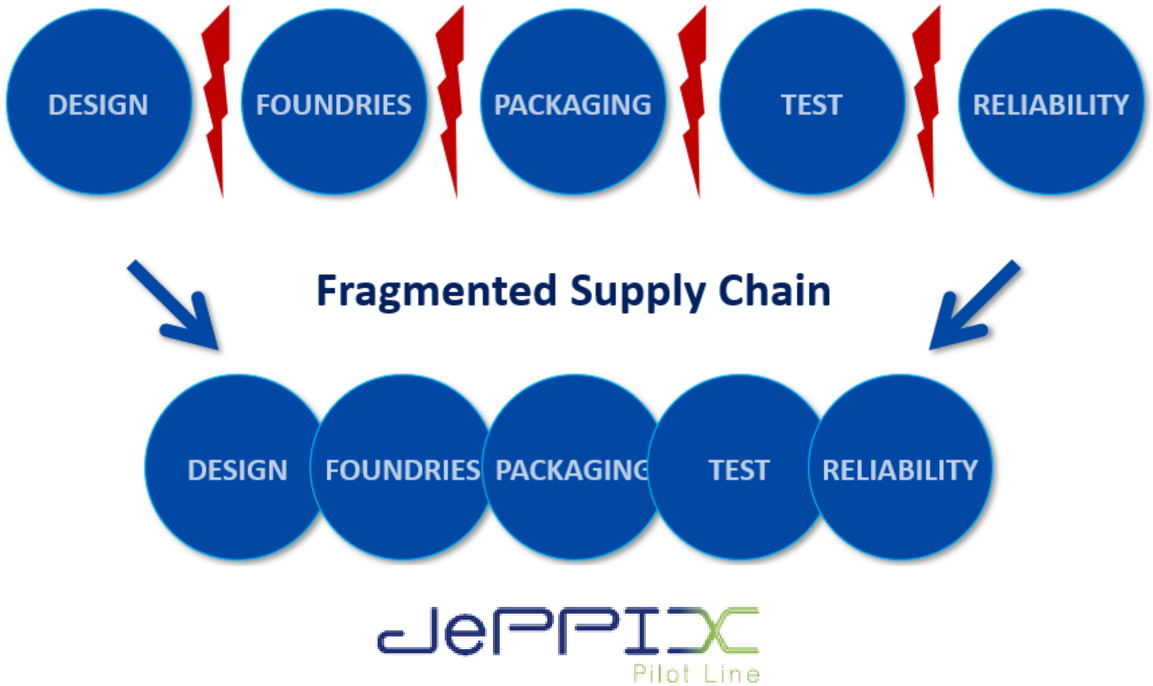
ADDING VALUE THROUGH PHOTONIC INTEGRATION

Large scale photonic integration can add transceiver value

- Increase bandwidth density
- Reduce cost/bit for many optical lanes
- Scale speed
- ++ value beyond current conventional optics

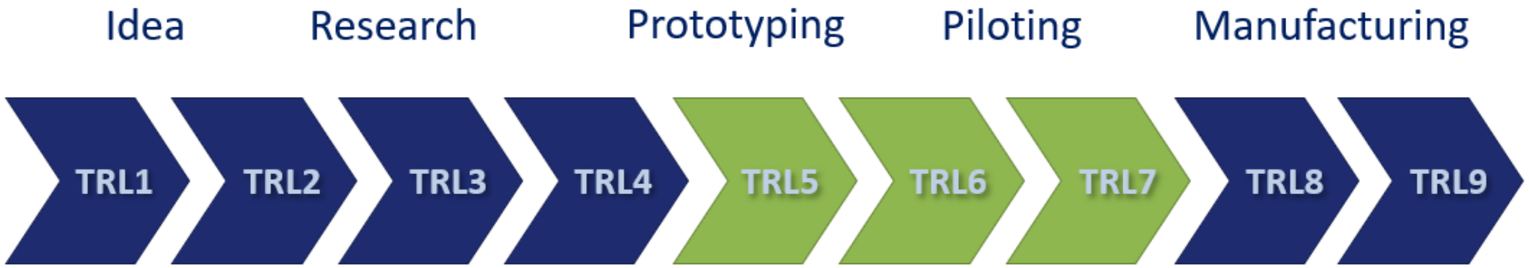
Accessing large scale photonic integration

- Entry point can be high
- Current supply chain is fragmented
- Enter the JePPIX pilot line



THE JEPPIX PILOT LINE

From prototype to pilot production



1. Create manufacturing process design kits by using smart testing to efficiently collect manufacturing statistics
2. Increase capacity for open access industrial prototyping and systematically improve performance of the building blocks
3. Validate the pilot line with two experienced participants to validate and stretch the platform performance beyond state-of-the-art
4. Demonstration through tens of external user designs
5. Establish a sustainable business model with a resilient industrial ecosystem to ensure continued open-access after four years
6. Support businesses as they scale to volume production

ACKNOWLEDGEMENTS

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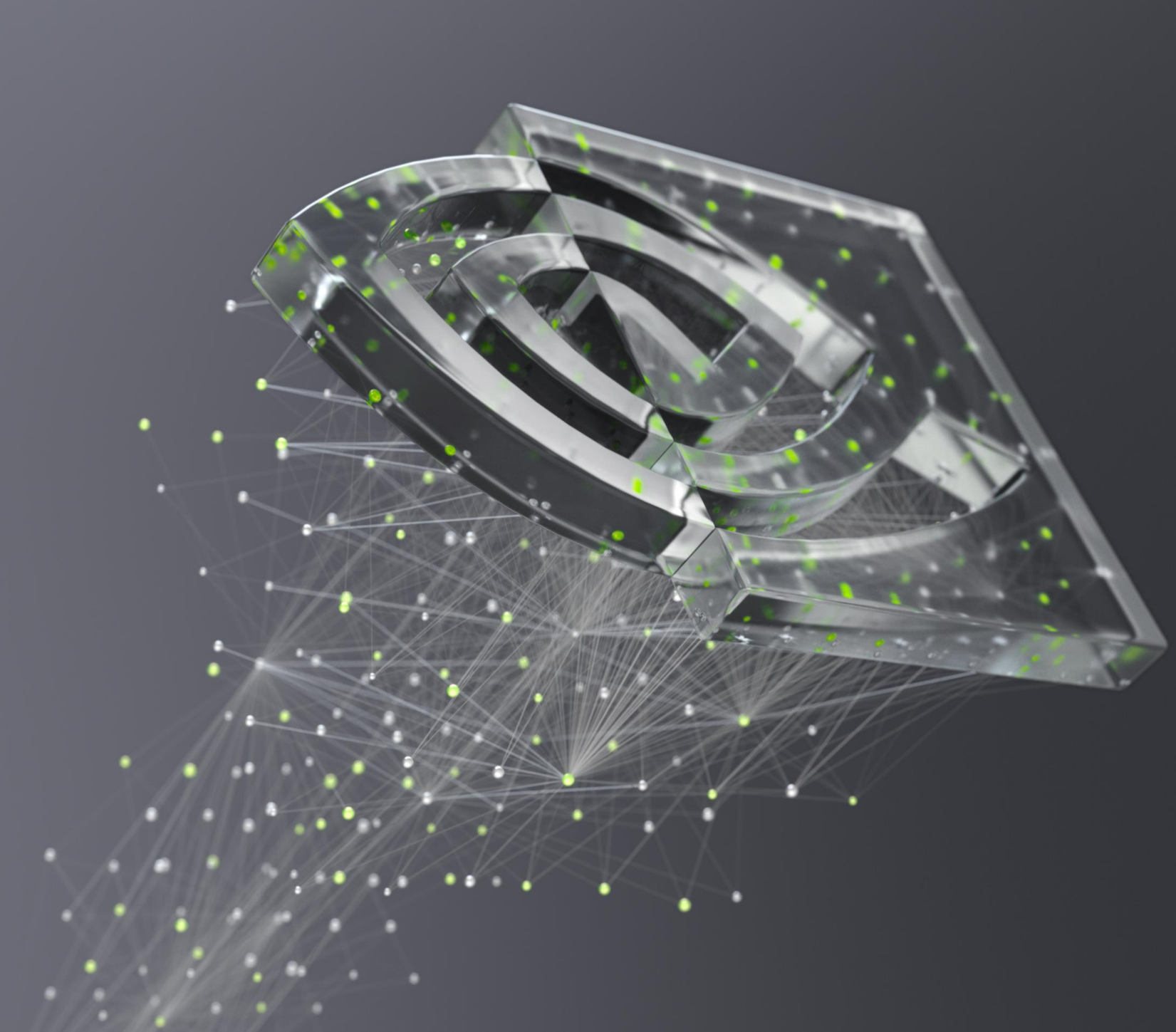
pilotline.jeppix.eu/



THANK YOU

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NVIDIA