LIGHTWAVELOGIC®

Faster by Design

NASDAQ
LWLG

Investor Presentation
May 2024

Safe Harbor

LIGHTWAVELOGIC®

The information in this presentation may contain forward-looking statements within the meaning of the Private Securities Litigation Reform Act of 1995. You can identify these statements by use of the words "may," "will," "should," "plans," "explores," "expects," "anticipates," "continue," "estimate," "project," "intend," and similar expressions. Forward-looking statements involve risks and uncertainties that could cause actual results to differ materially from those projected or anticipated. These risks and uncertainties include, but are not limited to, general economic and business conditions, effects of continued geopolitical unrest and regional conflicts, competition, changes in technology and methods of marketing, delays in completing various engineering and manufacturing programs, changes in customer order patterns, changes in product mix, continued success in technological advances and delivering technological innovations, shortages in components, production delays due to performance quality issues with outsourced components, and various other factors beyond the Company's control.

Corporate Overview

Lightwave Logic develops a platform leveraging its proprietary engineered electro-optic (EO) polymers to transmit data at higher speeds with less power

- **Large Addressable Market:** Optical transceivers market expected to grow to at least $100B by 2030 chiefly driven by data centers, fiber comm & AI requirements
- **Proprietary EO Polymer Technology:** Supports >3x faster data transmission speeds with ~10x lower power, relieving key bottlenecks in internet infrastructure
- **Robust Patent Portfolio:** Composed of 70+ patents and patents pending
- **Commercialization Underway:** Secured initial licensing agreement in May '23
- **Robust Balance Sheet:** $31M+ cash position provides significant optionality
- **Building a Foundation:** Expanded facility and team with in-house control of material supply, device fabrication & package design enables Lightwave to control its own destiny and maintain key trade secrets in-house
- **Experienced Leadership**: Management and Board are composed of technology and finance experts with 200+ years of combined experience

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Share Price[1]	$4.36
Market Cap[1]	$519.7M
Cash & Cash Equivalents[2]	$31.5M
Debt[2]	$0
Shares Outstanding[3]	120.1M
Headquarters	Englewood, CO

1) As of April 5, 2024
2) At Mar. 31, 2024

Why LWLG… Why Now?

Innovation is needed to keep up with data traffic

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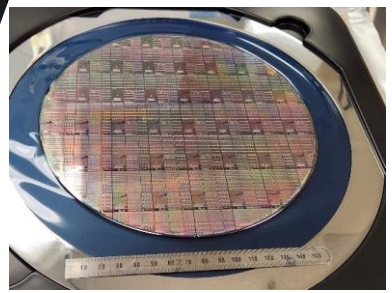
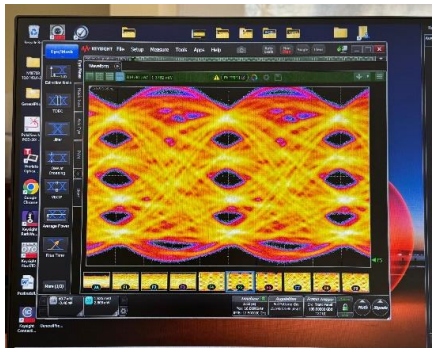
‘Traffic jams’ within internet infrastructure are increasing and silicon photonic have hit a wall in performance, and are unable to keep pace with the immense growth of data traffic





- **Lightwave Logic possesses a world class electro-optic polymer material** for use in data center applications
- Lightwave polymers can **turbo-boost** silicon photonics
- **Recent testing results are creating excitement** amongst Lightwave’s potential customer base

Radical innovation is needed to enable tomorrow’s data services within the current framework of existing internet infrastructure

Industry Demand Drivers

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Macro-tailwinds driving adoption of next-generation components

Switch Density

Need For Space

Real Estate Efficiency

Space is limited in data centers and competing solutions generally require a larger footprint than EO polymers

AI, Cloud & Streaming

Need For Speed

Artificial Intelligence
Cloud Services
Streaming/Gaming

Computing power required to train and utilize AI systems has been doubling every 2-4 months

Energy Usage

Need For Green

Energy Demand

Traffic and computing power is driving power consumption in data centers to extreme levels

Supporting the big macro trends today…and in the future

Sources: Lightwave Logic (LWLG), Statista, OpenAI, The Economist

What We Do

Award Winning Polymers

Polymers provide unique advantages over legacy technologies

- Materials are **polymers**
  - Like OLEDs – Organic LEDs used for TVs where their polymers generate light: **ours switch light**
- Modulators are **very small**
  - So small that they fit easily into pluggable transceivers, the critical devices used to transmit and receive data in data centers
- Polymer modulators have **transformational** performance head-room for the next decade
- Can **integrate** other devices with polymer modulators
  - Adding to existing silicon photonics infrastructure as well as multi-channel solutions for higher aggregate speeds

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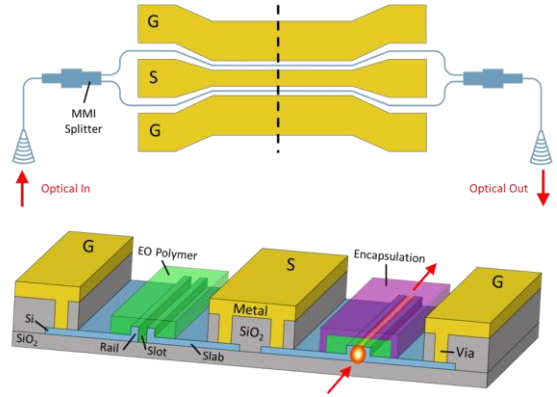
Lightwave Logic Voted ECOC 2023 Industry Innovation Award Winner

ecoc 2023 GLASGOW

Perkinamine® Electro-Optic Polymer



Electro-Optic Polymer slot modulators

Perkinamine® Electro-Optic Polymers

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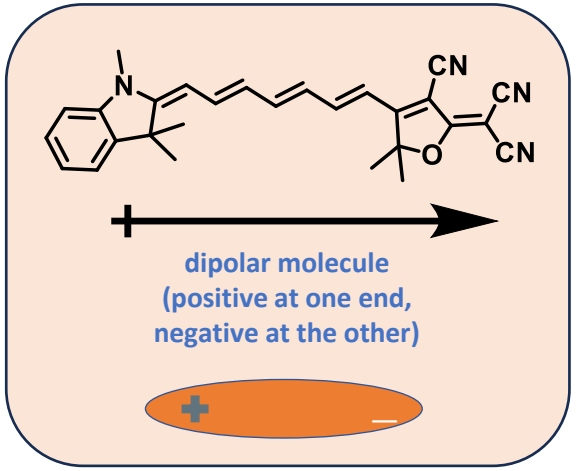
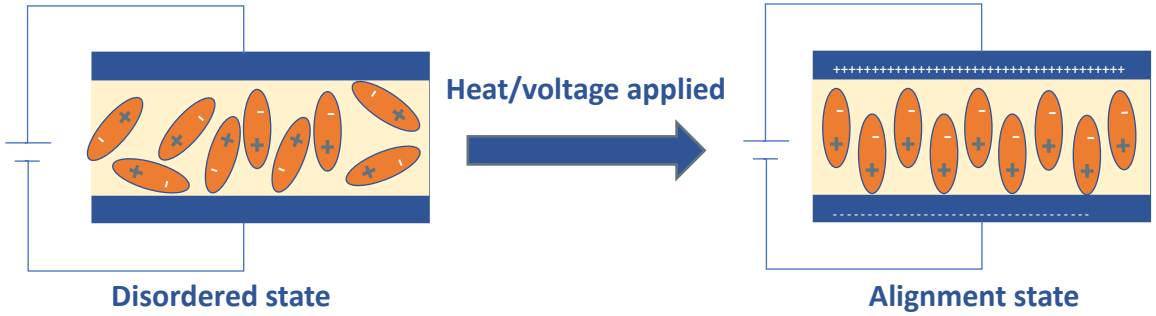
Our polymers are world-class and proven by third parties

Electro-optic polymers can be used to fabricate optical modulators





We create organic chromophores…

- Designed, simulated and modeled in Denver, Colorado
- Manufacturing chemistry facility that can scale volume
- Deep experience with material characterization, testing, lifetime, and reliability

Polymer Modulator Opportunities

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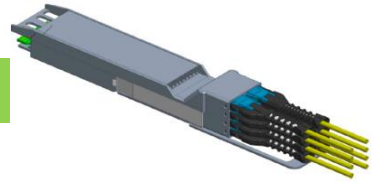
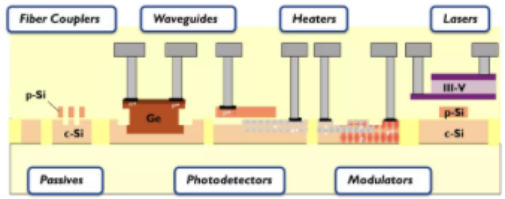
Electro-optic polymer modulators for transceivers suppliers

Upgrading to a 'V8'…



Electro-optic polymer modulators for Silicon Photonic platforms

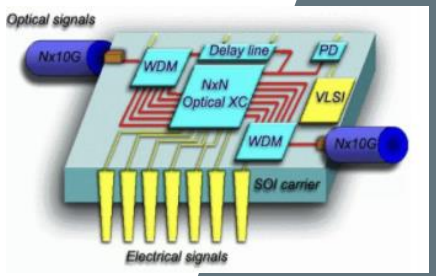
'Turbo-boosting' SiPh…



Source: ePIX Fab

Electro-optic polymer modulators for "Other" platforms including optical/quantum computing, HPC, and RF applications

Faster, lower power, smaller…



EO polymers *enable* higher performance data communications

Electro-optic polymer engines for fiber optic communications

Source: Ethernet Alliance, OSFP MSA, https://www.researchgate.net/figure/Schematic-of-an-on-chip-optical-network-with-various-components-illustrated-including_fig2_239929876, ePIXfab, corning

Initial Target Markets

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Polymers address a large, rapidly growing market

Fiber Communications

Photonics Applications	Photonics Components Market 2030*	Optical Transceivers* TAM (2022)	Optical Transceivers* TAM (2030)	Partner Type	Opportunity for Integrated Photonics (PICs) (Polymer, SiPh, InP)
Fiber comms	~$60-80B	$7B	~$40-60B	Foundry, OEM/CM (TxRx)	Existing/very strong growth
HPC/compute/AI	~$10-20B	$1B	~$10-15B	Foundry, OEM/CM (TxRx)	Existing/very strong growth
DCI/datacenter	~$20-30B	$9B	~$20-30B	Foundry, OEM/CM (TxRx)	Existing/strong growth
5G systems/back haul/RF	~$5-10B	~$1-2B	~$4-8B	Foundry, OEM/CM (TxRx)	Existing/strong growth
Display/project	~$10-20B	<$1B	~$5-15B	Foundry, OEM/CM (panel)	High-volume/strong forecast
Automotive (LIDAR)	~$30-50B	~$1-2B	~$20-30B	Foundry, OEM/CM (LIDAR)	High-volume & very strong forecast
Optical sensing/3D	~$4-10B	~$1-2B	~$2-5B	Foundry, OEM/CM (sensor)	High-volume & solid forecast
Bio-photonic sensing	~$2-5B	<$1B	~$2-3B	Foundry, OEM/CM	Strong forecast
Medical	~$5-10B	<$1B	~$5-8B	Foundry, OEM/CM	Strong forecast
Instrumentation	~$2-3B	<$1B	~$1-2B	Foundry, OEM/CM	Strong forecast

Sources: *Lightwave Logic (LWLG) estimates using market research data

Compatible with Existing Silicon Foundries

Polymers are Ideal for Silicon Foundries…

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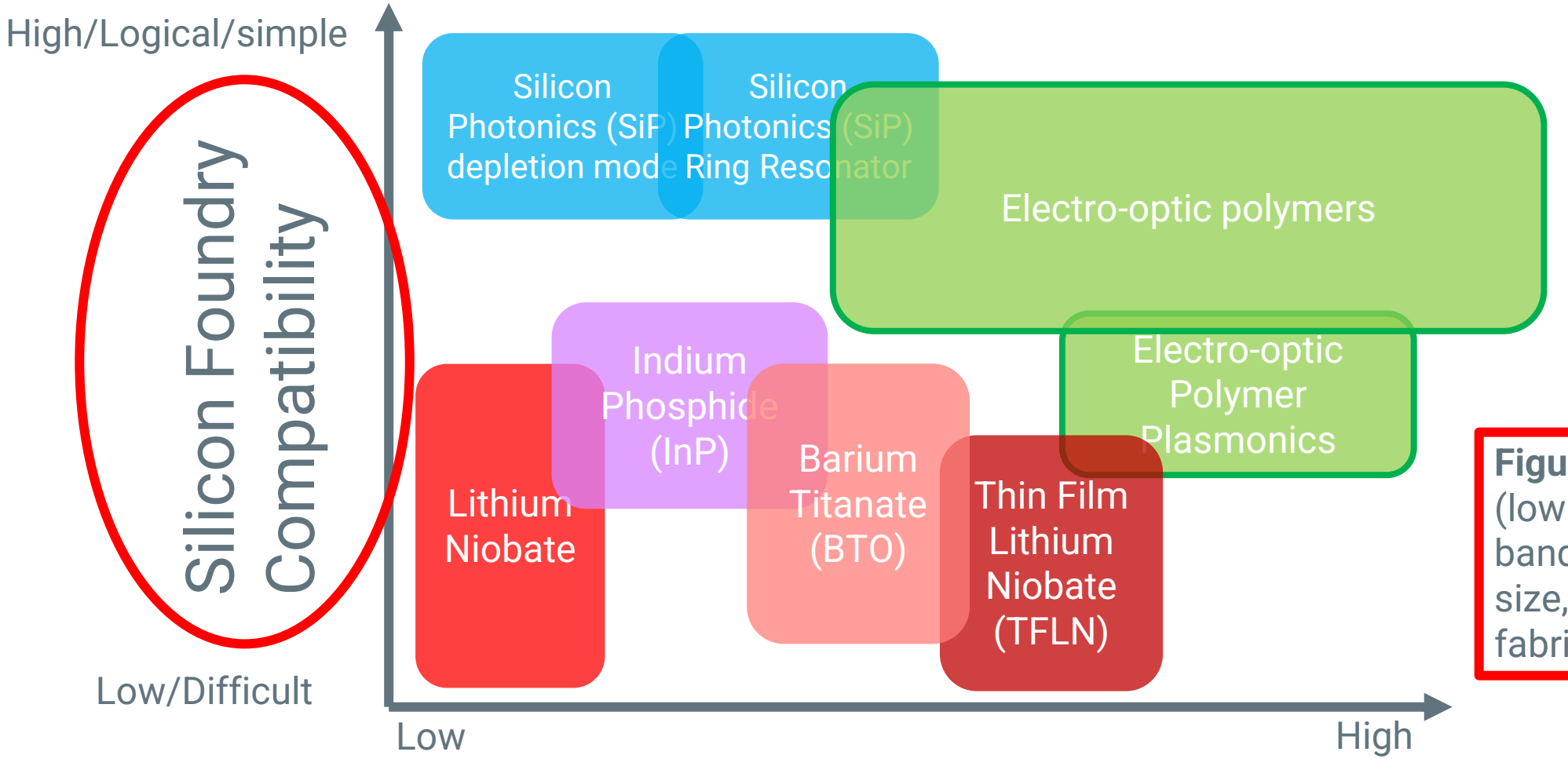

Figure of Merit (low V, high bandwidth, small size, ease of PDK, fabrication)

Polymer positioning for heterogeneous integration is aligns with silicon foundries very well

Leveraging Silicon Ecosystem

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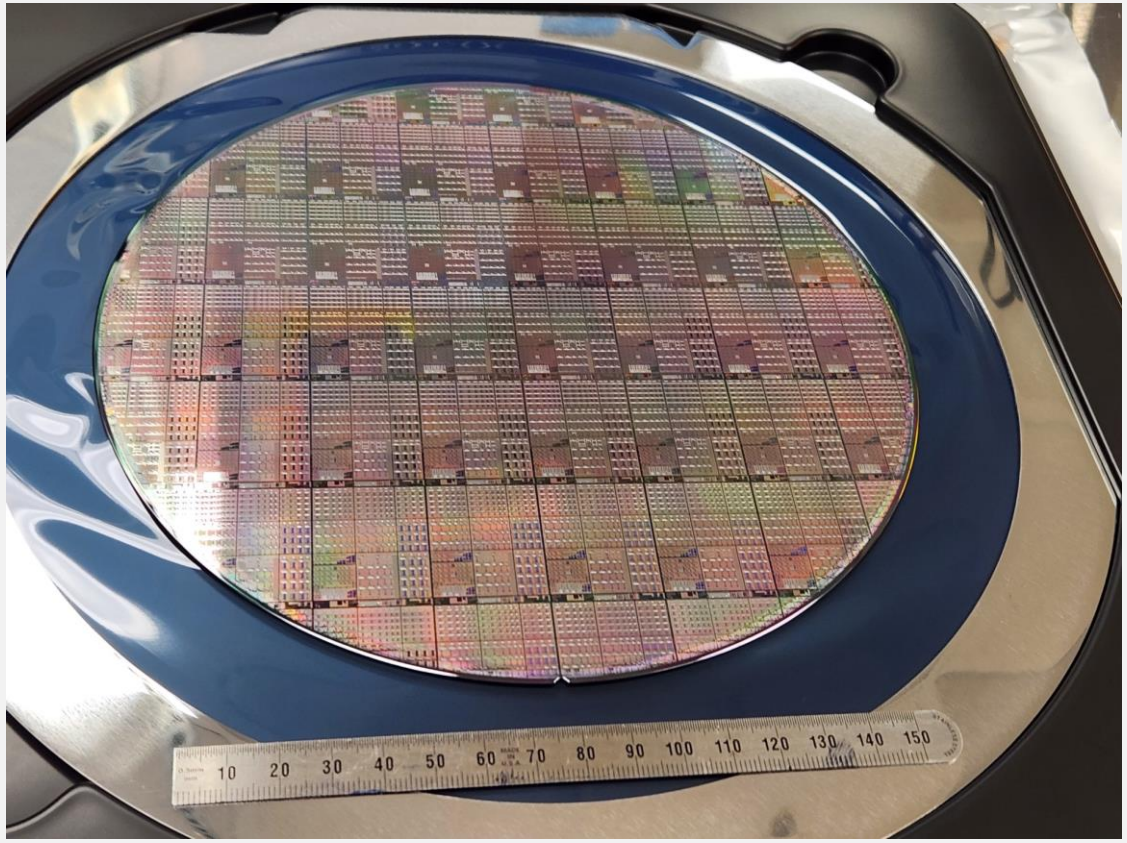
Scalability with 200mm Wafers

- Polymers *can easily* fit into silicon foundries compared to legacy and new exotic materials
- Polymers *extend* silicon photonics performance
- Polymers *meet* the performance for datacenter applications



Volume scale silicon slot designs on 200mm wafers

Image from Commercial Foundry – Industry Standard Design

Heterogeneous Polymer Slot Modulator

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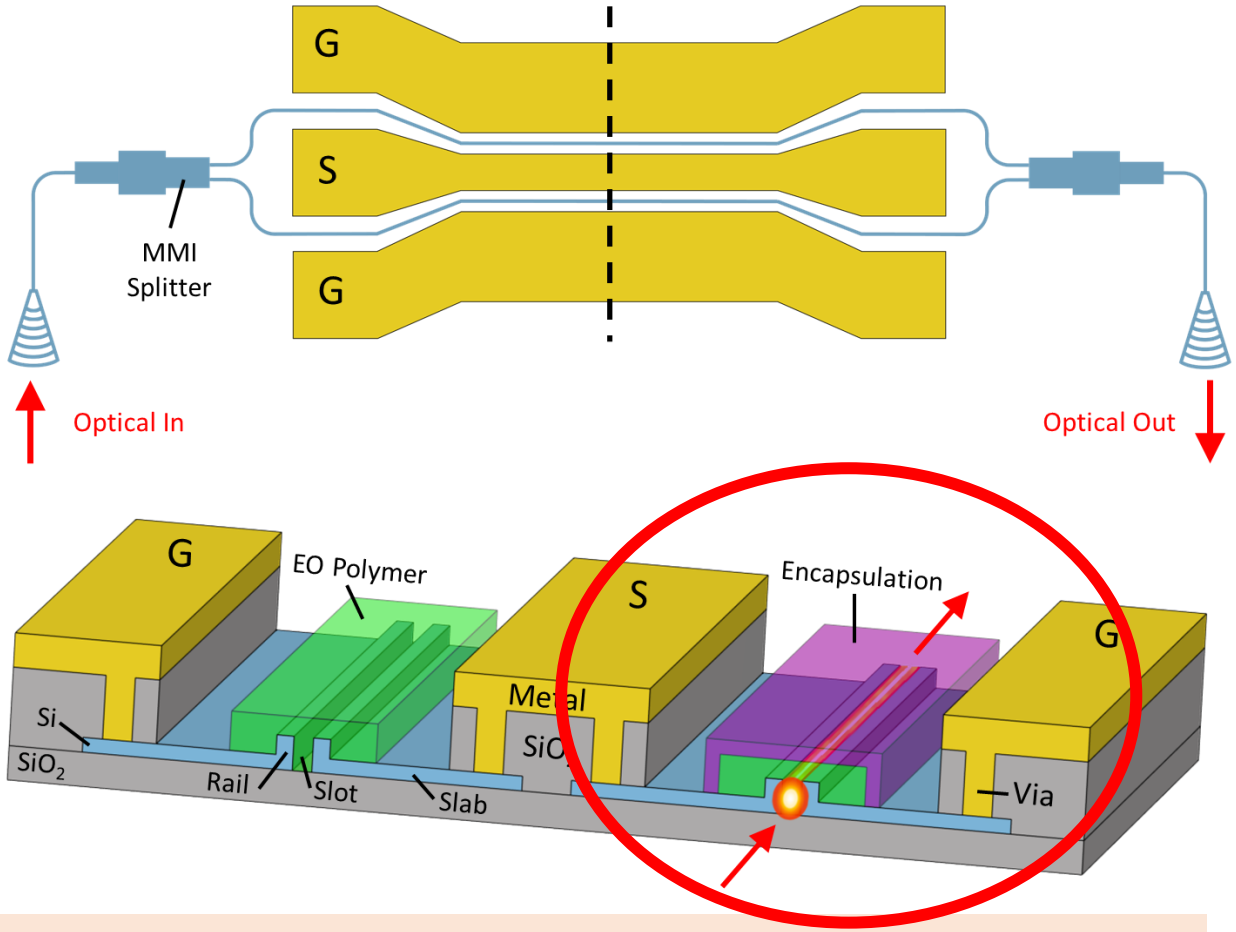
Our polymers are *easily fabricated* in silicon fabs → ideal for heterogenous integration



EO polymer heterogeneous integration onto silicon wafers

- **Heterogeneous integration** of polymer on Silicon Photonics Platform
- Low drive voltage and small form factor for **low power consumption** and high density
- Very high bandwidth (**70-100GHz**)
- Fabricated onto **200mm** silicon wafers

3rd party use of Perkinamine® LWLG polymers

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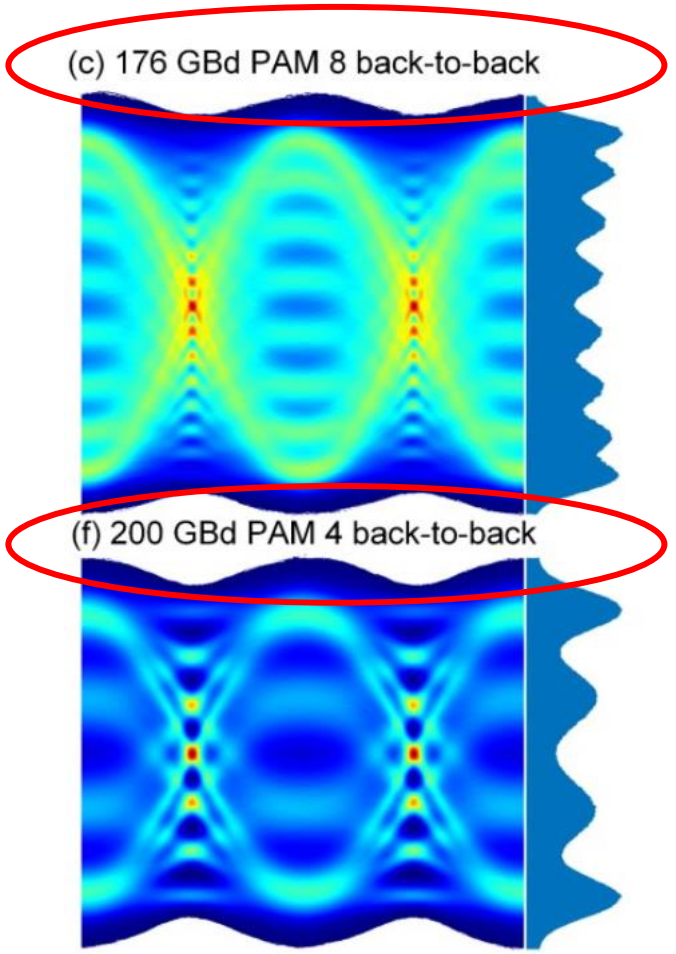
- *World class performance EO polymers* used for *400G lanes*
- Next generation node for datacenters
- Potential to enable 4 lane pluggable transceiver at 1.6Tbps & 8 lane at 3.2Tbps



Sources: ETH Zurich, Kulmer et al, OFC 2024 (W4H.5), LWLG Perkinamine™ chromophore series 3 material

Business Plan: Licensing LWLG Material and Selling Polymer Modulators

Implementing a New Technology Platform

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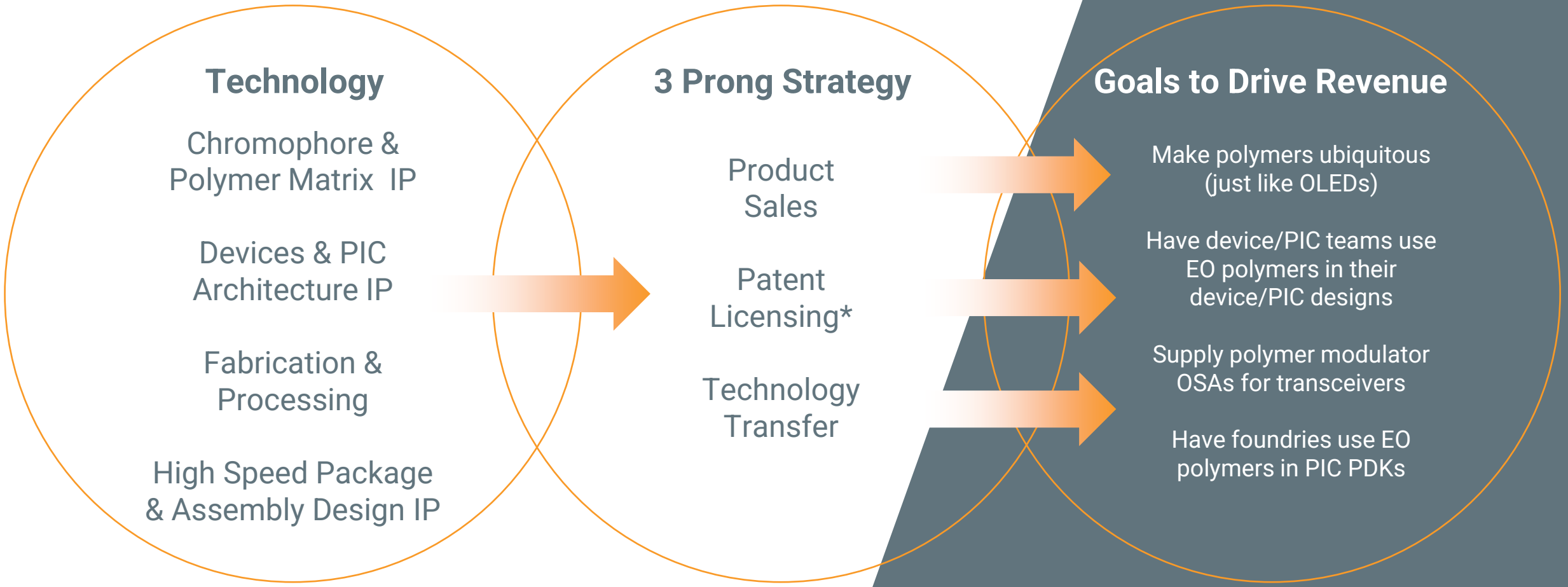
Licensing model provides inherent scalability



Patent licensing and product sales to drive revenue

Source: Lightwave Logic (LWLG)

Patents Drive Licensing Opportunities

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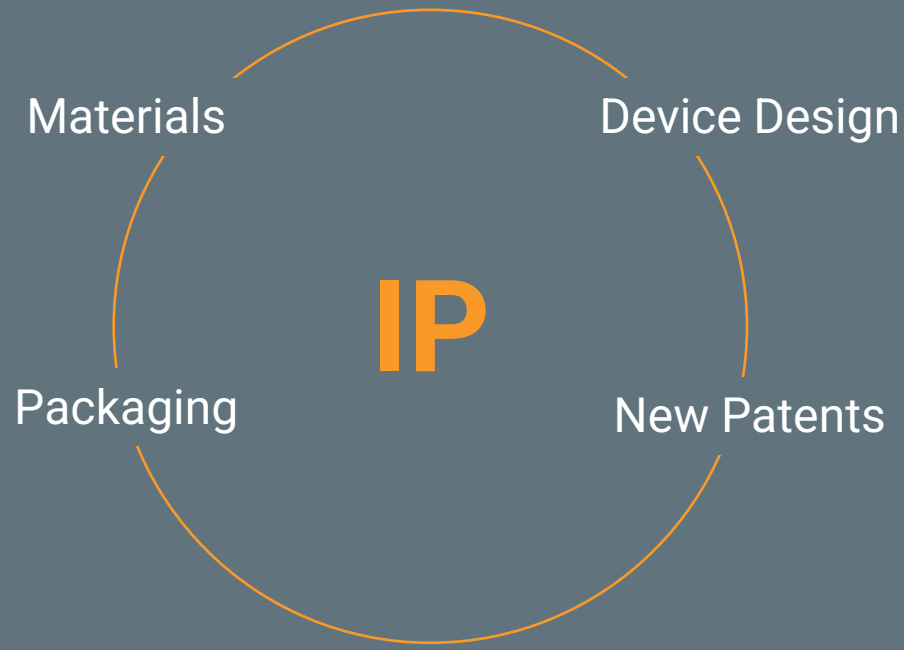
Robust intellectual property (IP) portfolio enables licensing & tech transfer for long term revenue generation



- **Develop and license polymer-based technologies** that are engines for the internet, optical networking, data centers
- **Patent portfolio creates a strong moat** and know-how to carve out a leadership position with high speed, low power EO polymers
- Proprietary EO polymers are continually strengthened to fortify the patent moat, currently with **over 70 patents issued and pending**

Focus on data communications, datacenter market segments

Initial Licensing Agreement

Secured initial market acceptance for polymer technology

First Perkinamine® customer licensing agreement secured in May 2023

Agreement Structure:

- LWLG to supply EO material
- License initiation fee
- Royalties (% per unit)
- Minimum royalty
- Minimum sales volume (units)

Represents commercial market acceptance of our polymers, with follow-on licensees in progress

Commercial Partnering – AMF foundry

- Turbo-charging silicon photonics
- Partnering for polymer slot modulators on 200mm silicon wafers
- Puts Lightwave in a strong position to ramp volume both for polymers as well as 200-mm silicon wafer volume with AMF

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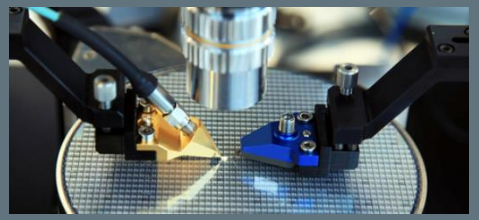
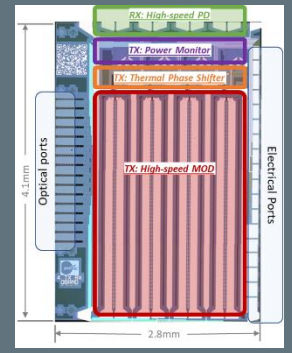
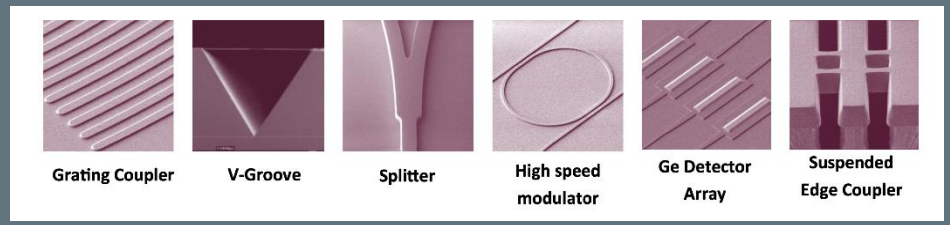
amf ADVANCED MICRO FOUNDRY

A High Mix specialty commercial foundry for integrated optics manufacturing





AMF Transceiver Reference Design



Comprehensive PDK

Source: AMF; https://www.advmf.com

Commercial Interest Growing

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Recent technology demonstrations of our polymer modulators

World class results

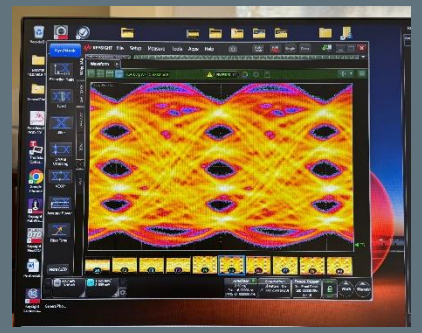
- Ideal for 800Gbps pluggable transceiver market with 200G lanes

Types of visitors

- Commercial Tier 1 companies include:
  - Hyperscaler/Datacenter companies
  - Telecom system companies
  - Optical system corporations
  - Optical component/transceiver corporations
  - OSATs (Outsources Semiconductor Assembly and Test)
  - CMs (Contract Manufacturers)
  - Silicon Foundries
- Research analysts
- Universities
- Defense industry

Combined licensing/product interest

Over 25 commercial visitors this year




Clearly Defined Commercial Pathway

Near Term Commercial Activities & Goals

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Initial commercial activity developing well and is expected to grow in 2025

2024→ 2025
Engagement with companies for both materials supply licensing as well as polymer modulator prototypes

Source: LWLG internal data

Maturing our Perkinamine® Platform

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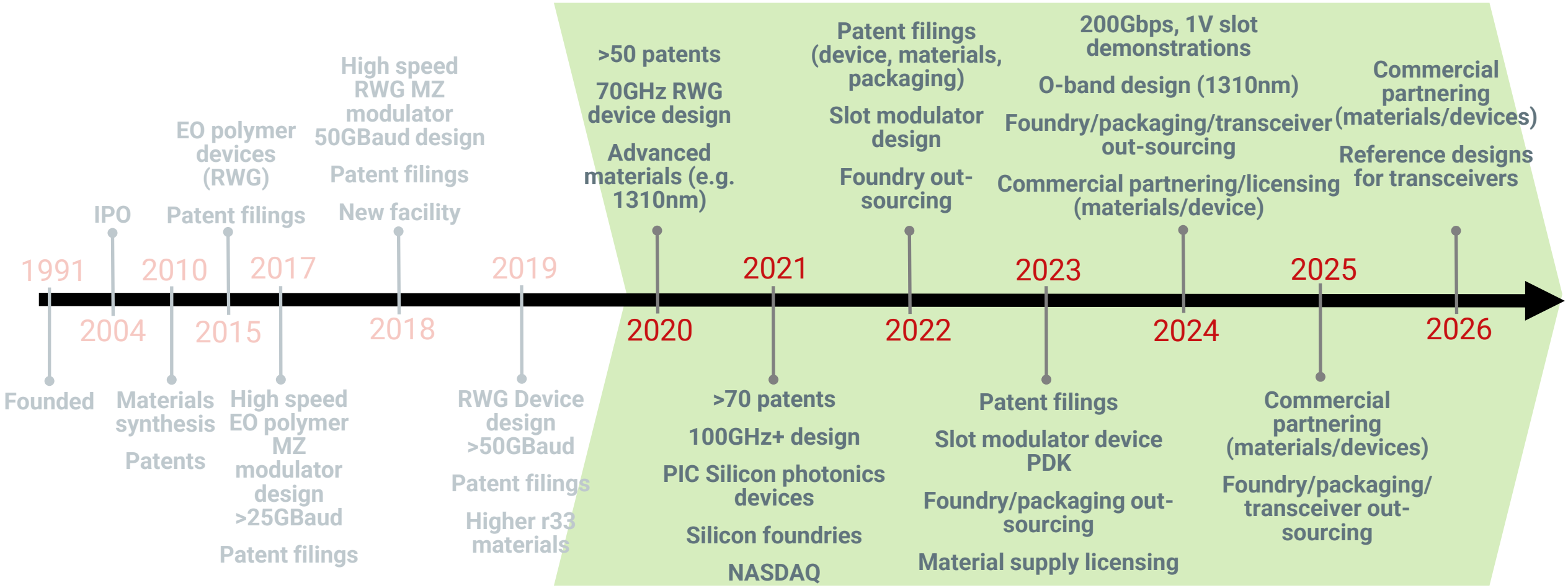
We are *enabling* polymer devices to *extend* silicon photonics using our EO polymers…



Maturing our electro-optic polymer platform using partnering

Scaling for Growth

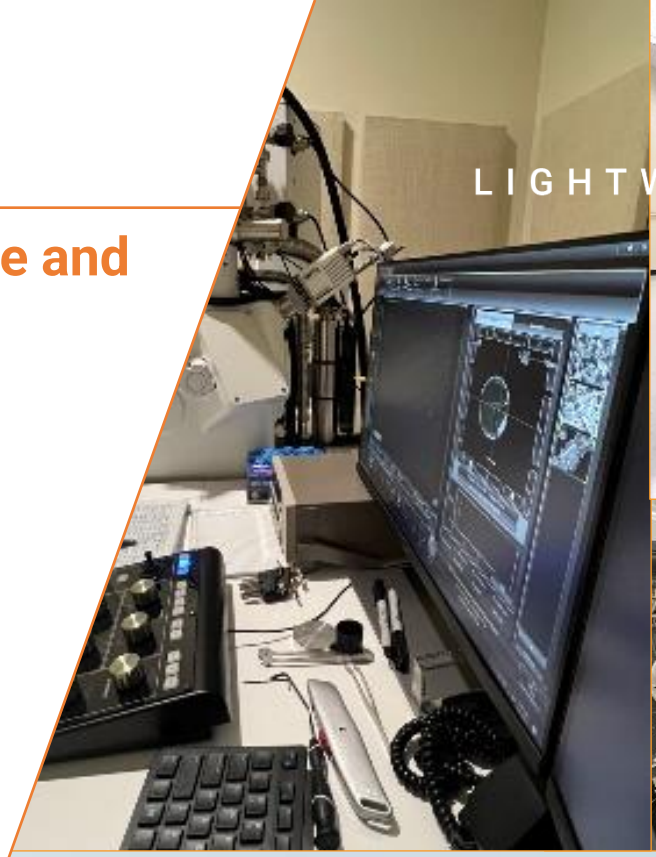
We have the team and facilities to make polymer chromophore and polymer slot modulators ubiquitous

Expanded Lightwave Logic facility is complete and operational:

- Acquired almost 10,000 sq ft adjoining current facility, representing a 70% increase in available space
- New space is being used for:
  - Production device test and evaluation center
  - Production reliability center
  - Laser characterization center
  - SEM analysis center
  - Expansion of chemical synthesis production line
  - Office and meeting space for additional staff

New space supports notable recent hires, including:

- Organic and computational chemists
- Material science and device engineers
- Packaging and reliability engineers



Experienced Management & Board

Dr. Michael S. Lebby
Chairman & CEO

35+ years experience in photonics & semiconductors

Ronald A. Bucchi
Independent Director

35+ years experience in accounting & finance

Dr. Fred Leonberger
Independent Director

35+ years leadership in optical modulators & systems

Siraj Nour El-Ahmadi
Independent Director

30+ years leadership experience in telecom network equipment

Mr. Jim Marcelli
President & COO

35+ years experience in finance & operations

Craig Ciesla
Independent Director

25+ years experience in technology and engineering

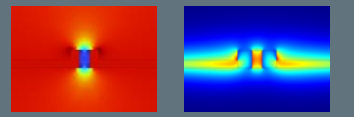
Laila Partridge
Independent Director

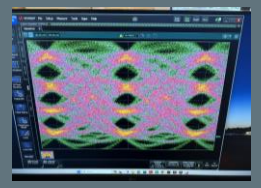
30+ years experience in technology, corporate innovation and finance

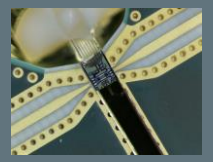
Summary

Turbo-charging silicon photonics with polymers for commercial traction…

- **Large & Growing Addressable Market:** Optical pluggable transceivers market >$100B by 2030
- **Proprietary EO Polymer Technology:** Demonstrated 200Gbps 1V performance in 2024.
- **Commercialization Underway:** Increased activity from packaged slot modulator demonstrations for material supply licensing and prototyping from Tier 1s
- **Robust Patent Portfolio:** Over 70+ patents and patents pending
- **Robust Balance Sheet:** $30M+ cash position provides significant optionality
- **Building a Foundation:** Partnering with commercial silicon foundry for 200mm wafers.







Sources: Ethernet Alliance, OSFP MSA, https://www.researchgate.net/figure/Schematic-of-an-on-chip-optical-network-with-various-components-illustrated-including_fig2_239929876, ePIXfab, corning

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LIGHTWAVELOGIC®

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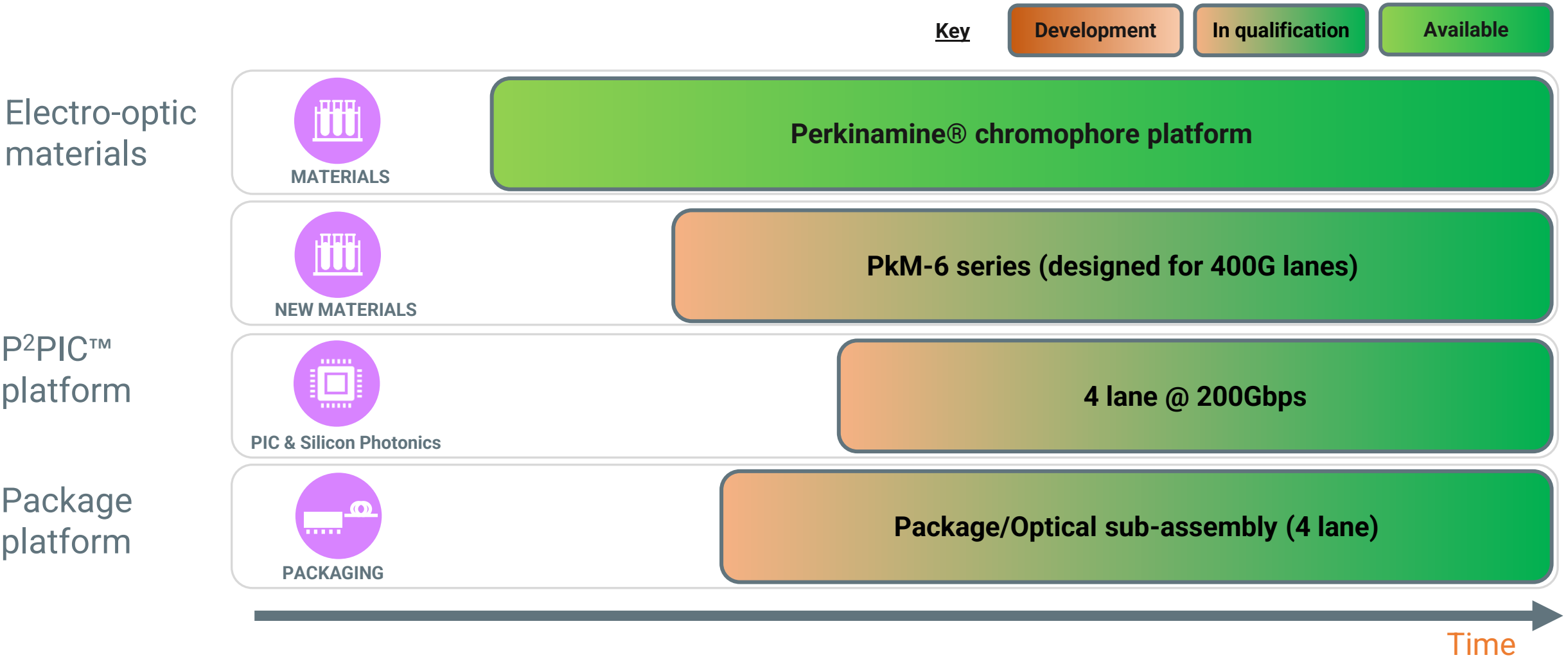
Englewood, CO 80112

Appendix

Product Roadmap

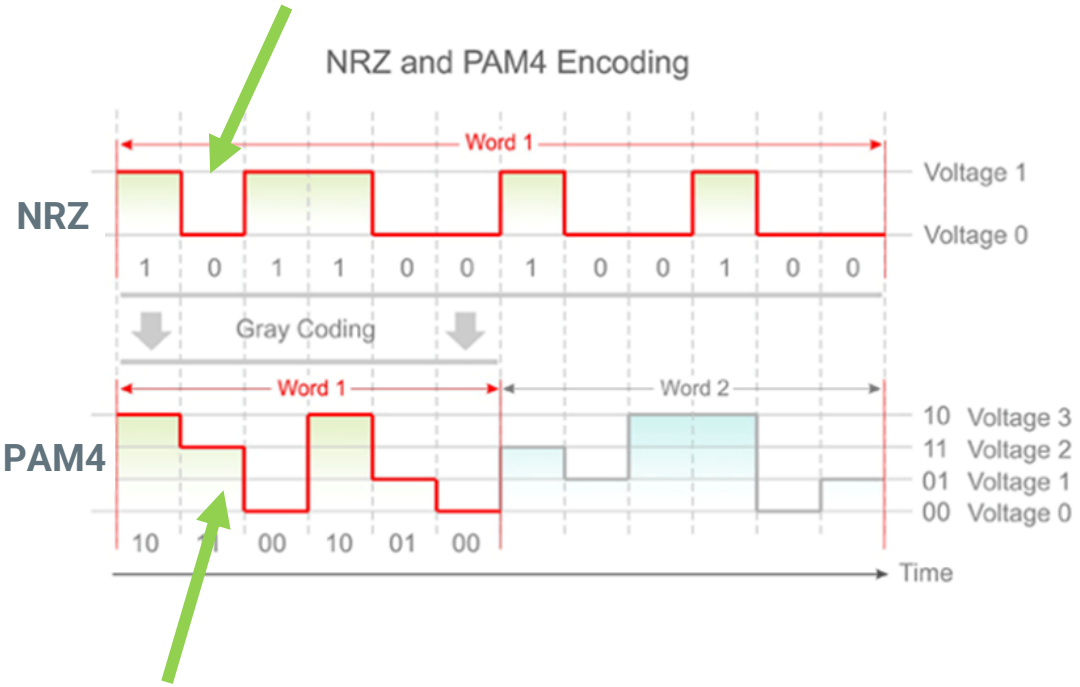
LIGHTWAVELOGIC®



Our technology roadmap emphasizes our unique value for commercialization

Commercial Modulation and Eyes

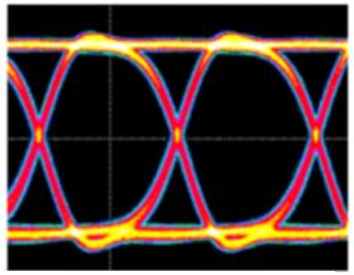
NRZ = Non-return to Zero
(i.e. castellated waveform)



PAM4 = Pulse Amplitude Modulation at 4 levels (step waveform)

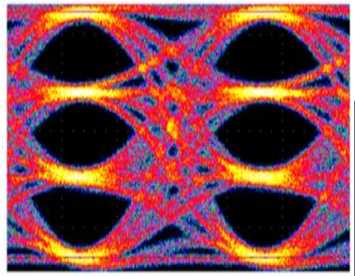
Open eyes mean no errors

2 levels → 1 bit



NRZ
1 bit per symbol

4 levels → 2 bits



PAM4
2 bits per symbol

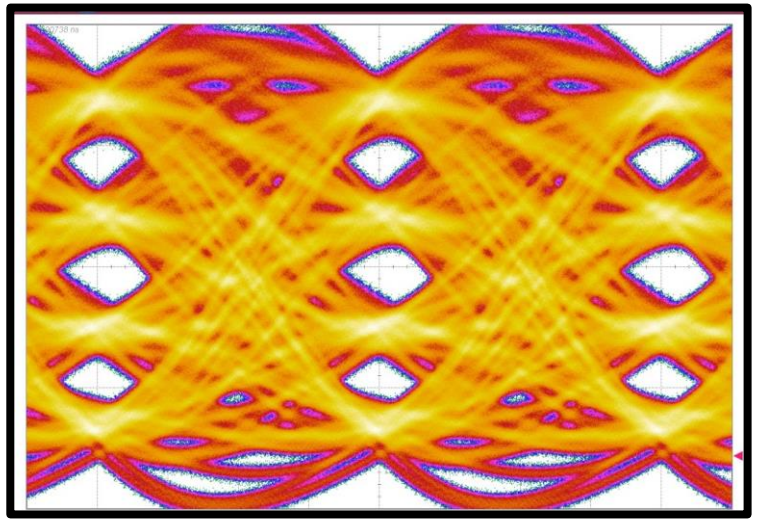
- **Open Eyes mean high quality transmission and no errors**
- For Same Bandwidth PAM4 as Double the Capacity
- Eyes show superposed traces for many sequential bits
- Show the levels and the transitions for any different data pattern, i.e. any different sequence of 1's and 0's

PAM4 has X2 the capacity for the same bandwidth

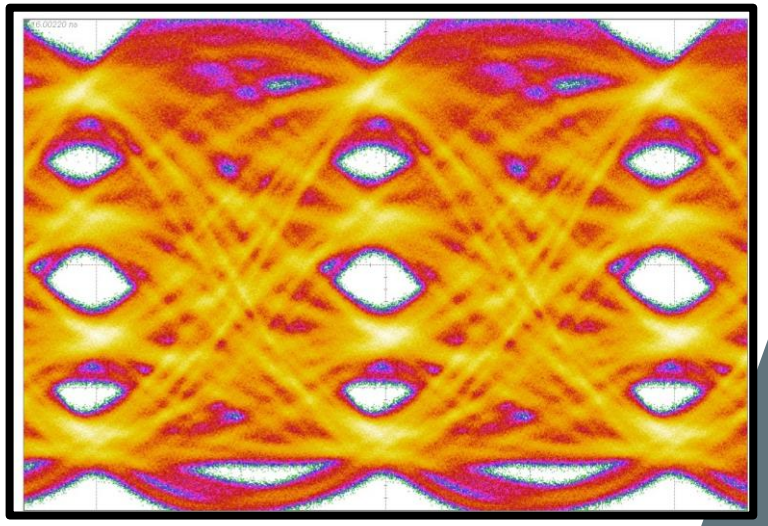
World-Class Performance…

LIGHTWAVELOGIC®

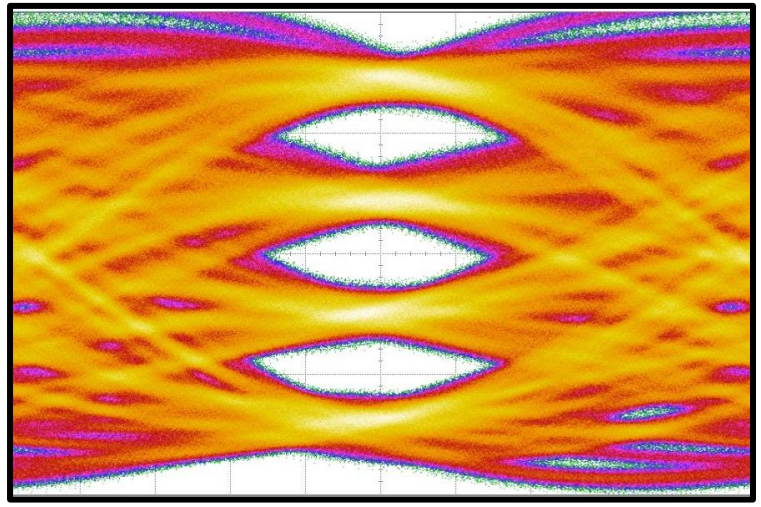
90 Gbaud, 180 Gbit/s, V_{drive} < 2 V



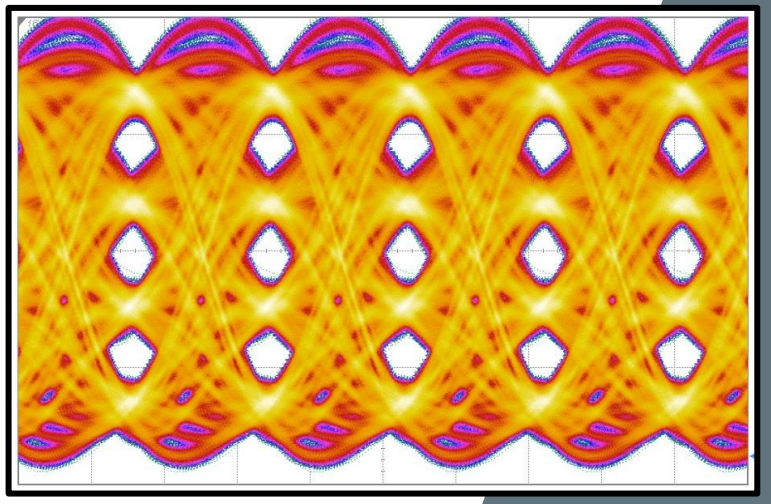
100 Gbaud, 200 Gbit/s, V_{drive} < 2 V



53 Gbaud, 106 Gbit/s, V_{drive} < 2 V



53 Gbaud, 106 Gbit/s, V_{drive} < 2 V



Drive Voltage ~1V

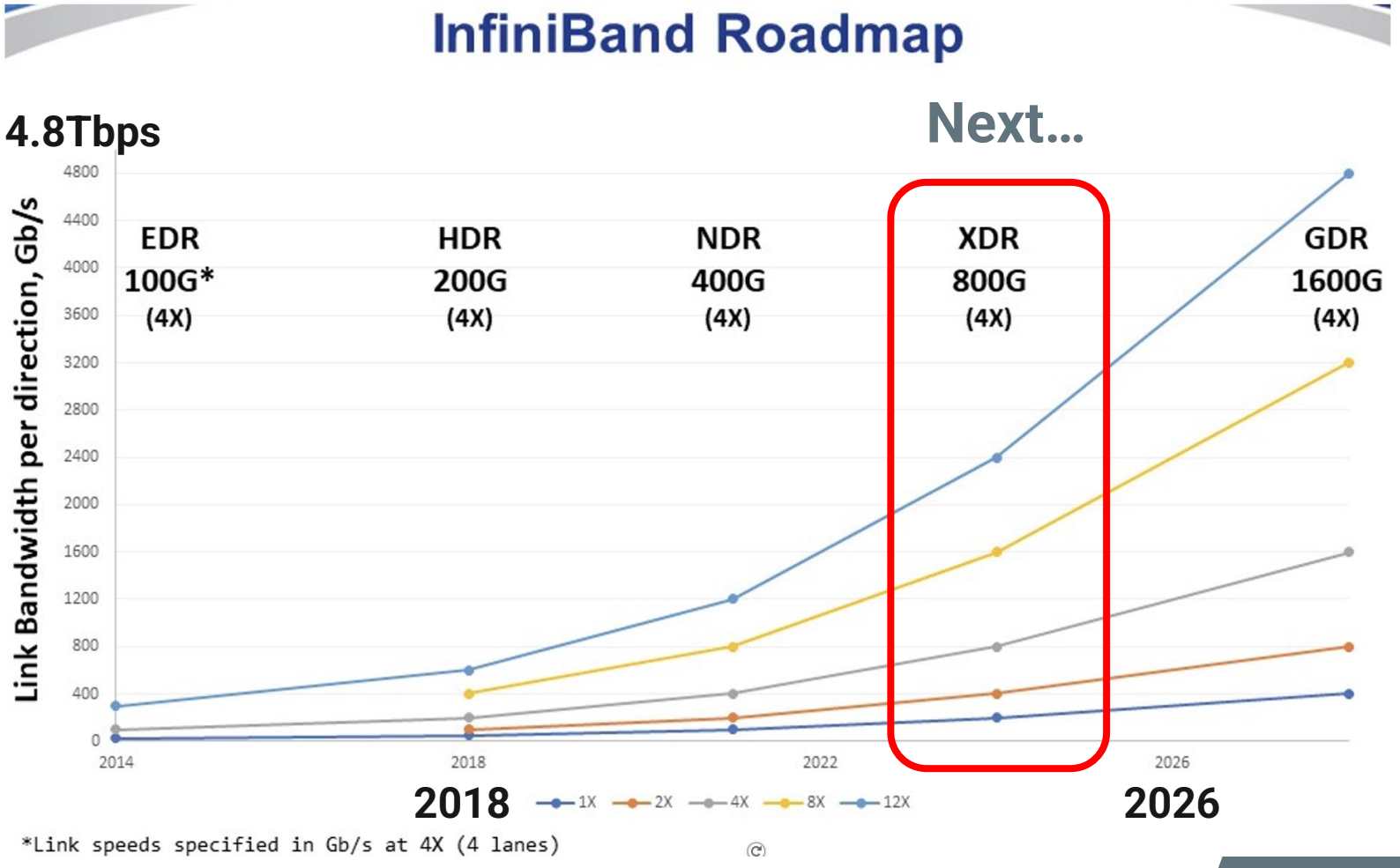
Up to 100GBaud PAM4 (200Gbps)

Open eyes…

Open eyes…

Ideal for low voltage 800Gbps 4 channel pluggable transceivers

Appendix: Industry Roadmap to Higher Speeds

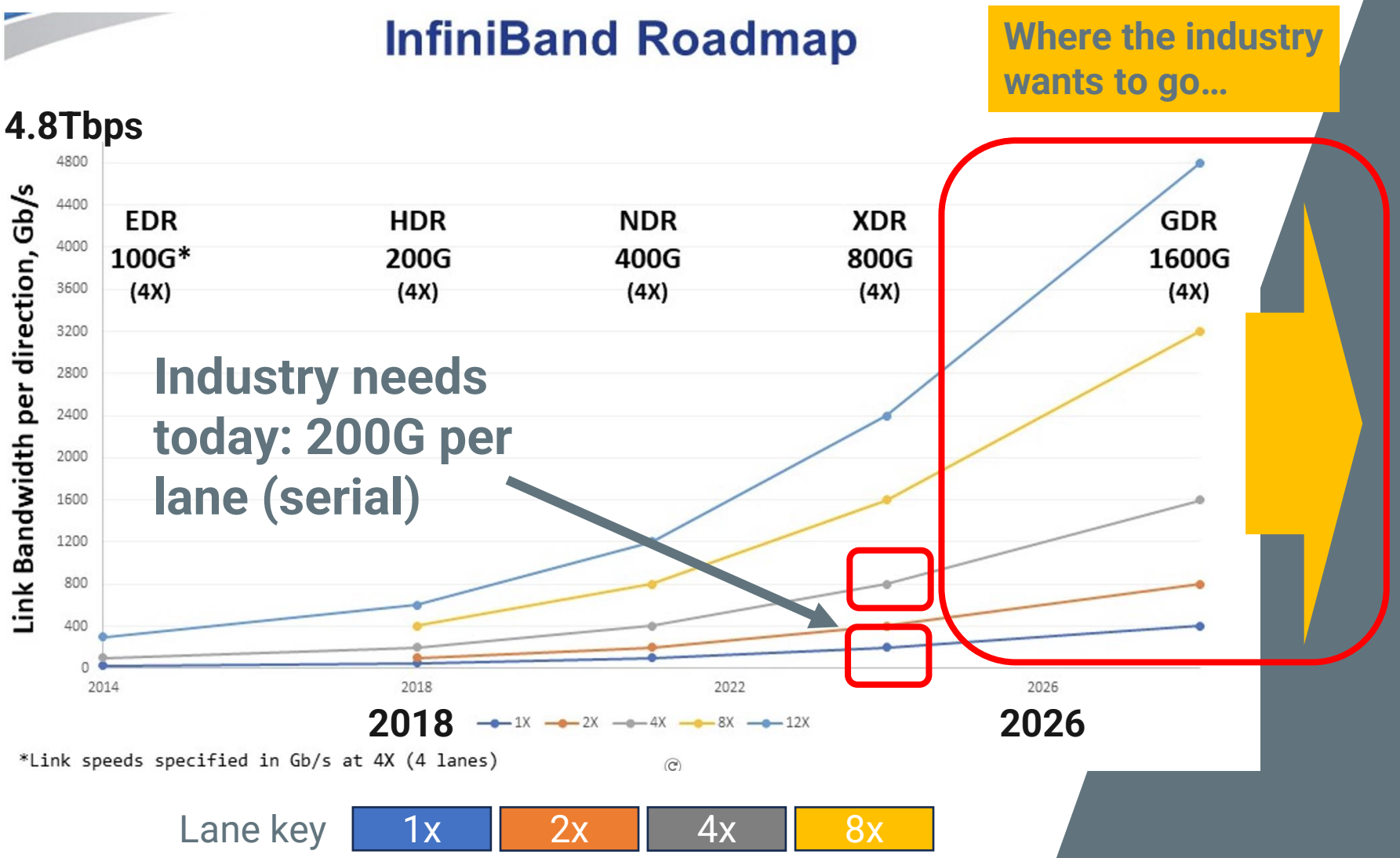


Lane key: 1x 2x 4x 8x

Next is 800G…

Source: Nvidia, https://www.infinibandta.org/infiniband-roadmap/;lightcounting

Appendix: Drive to Higher Lane Speeds

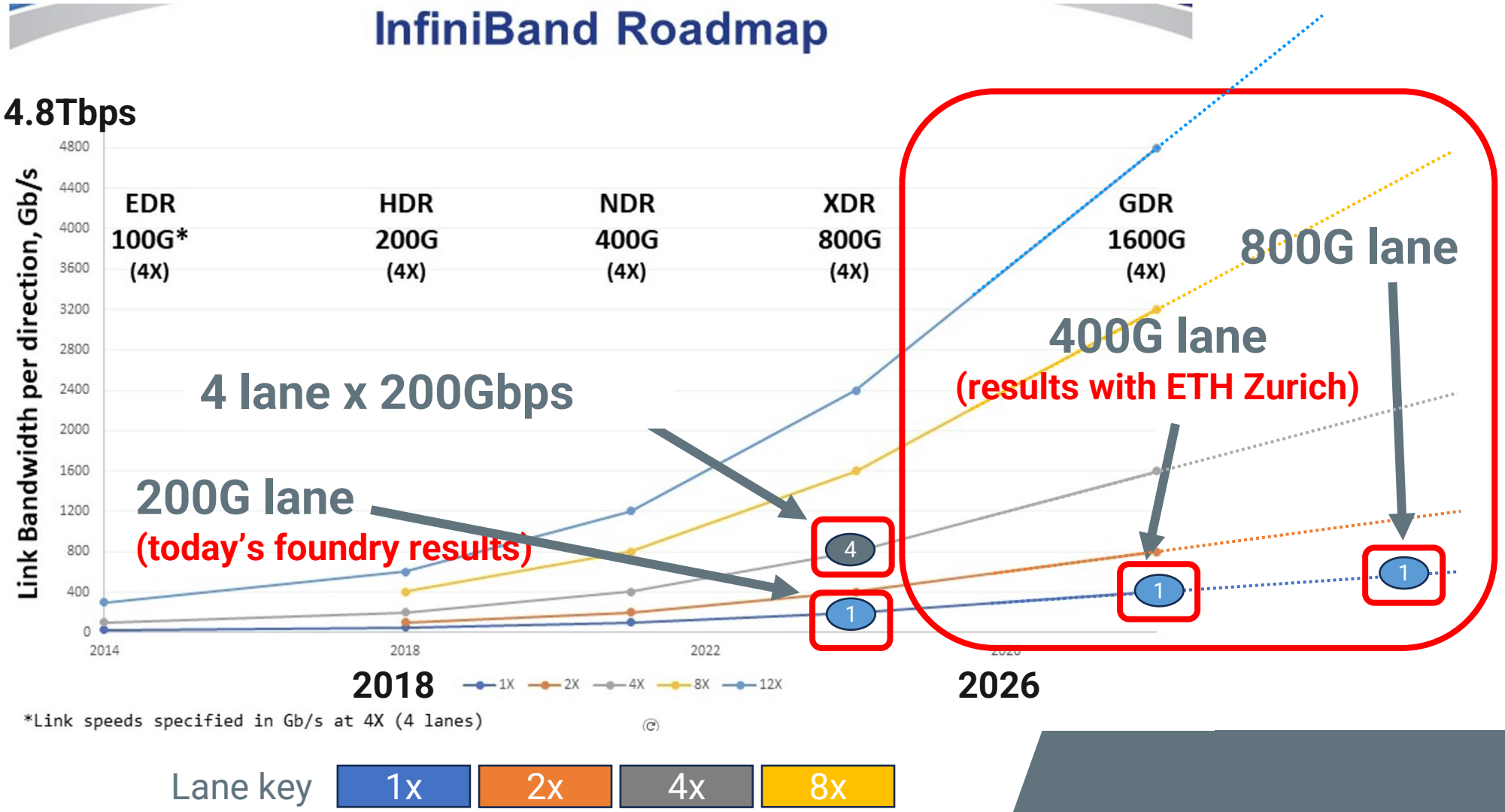


"in many ways polymers will be an ideal enabler of the growth expected in Infiniband usage"

Infiniband is a key enabler for NVIDIA → higher speeds are required now

Source: Nvidia, https://www.infinibandta.org/infiniband-roadmap/;lightcounting

Appendix: Industry Drive to Higher Lane Speeds

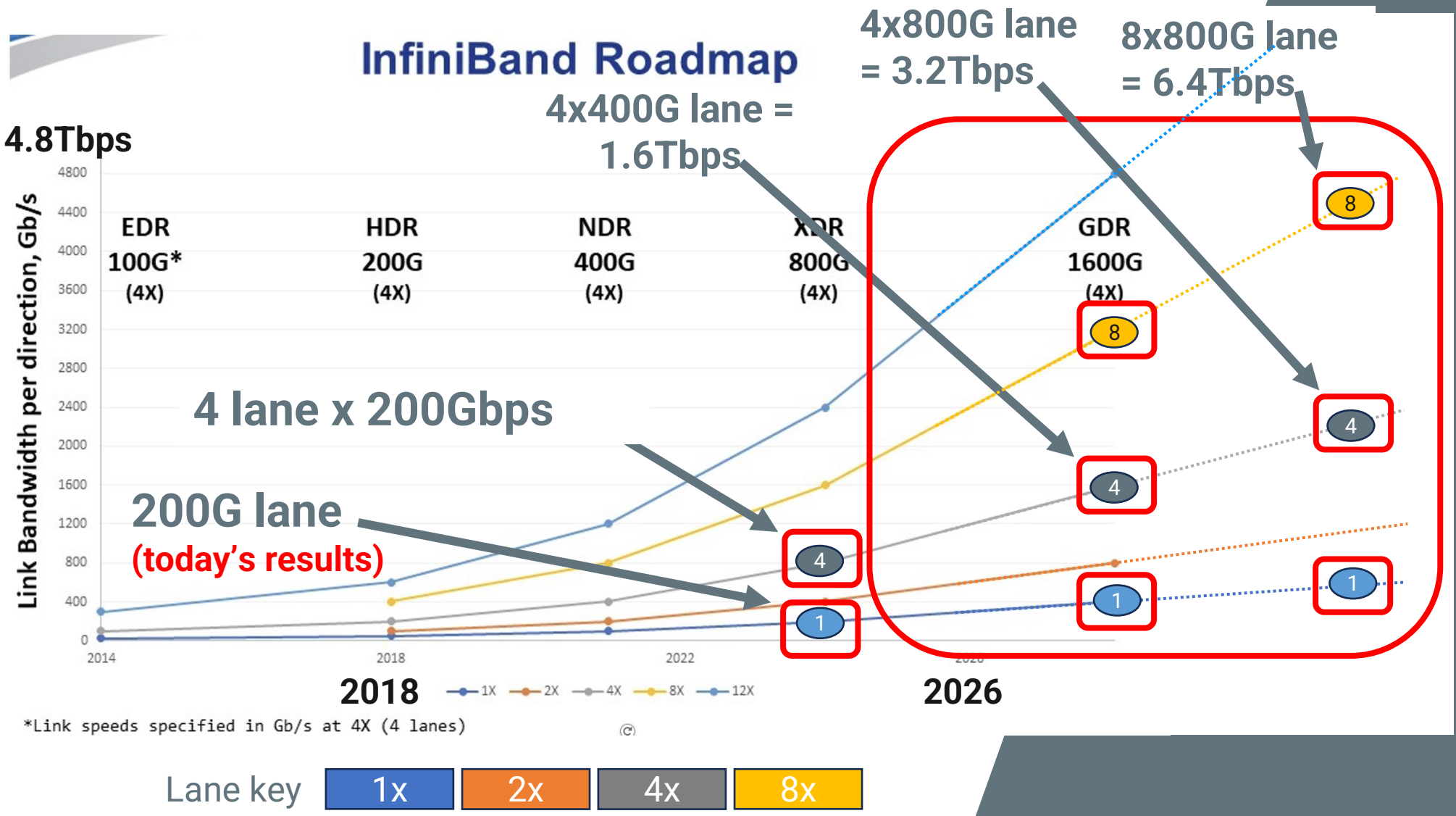


Lane key: 1x 2x 4x 8x

Recent results are an important step forward

Source: Nvidia, https://www.infinibandta.org/infiniband-roadmap/;lightcounting

Appendix: Industry Roadmap Cont.



Lane key: 1x 2x 4x 8x

Polymers fill the roadmap…

Source: Nvidia, https://www.infinibandta.org/infiniband-roadmap/;lightcounting