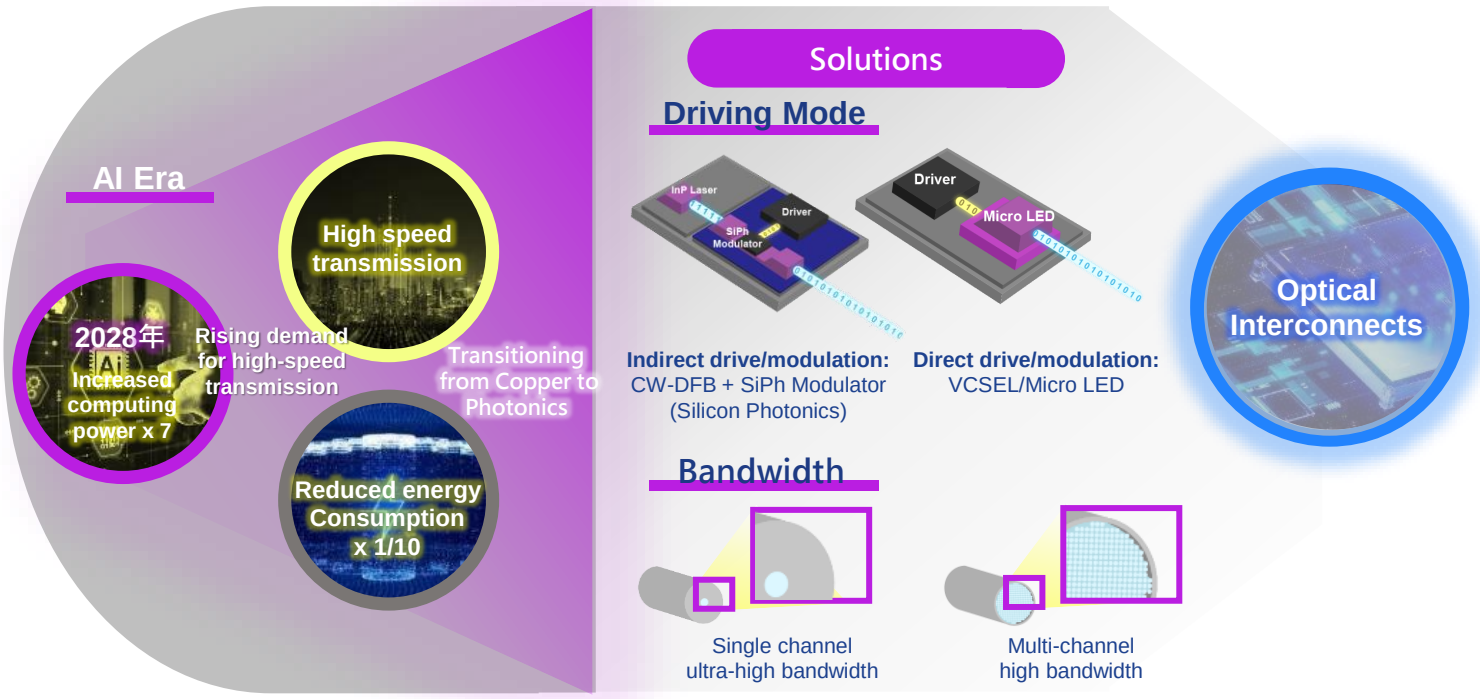
# Emerging Market

## AI Optical Interconnects

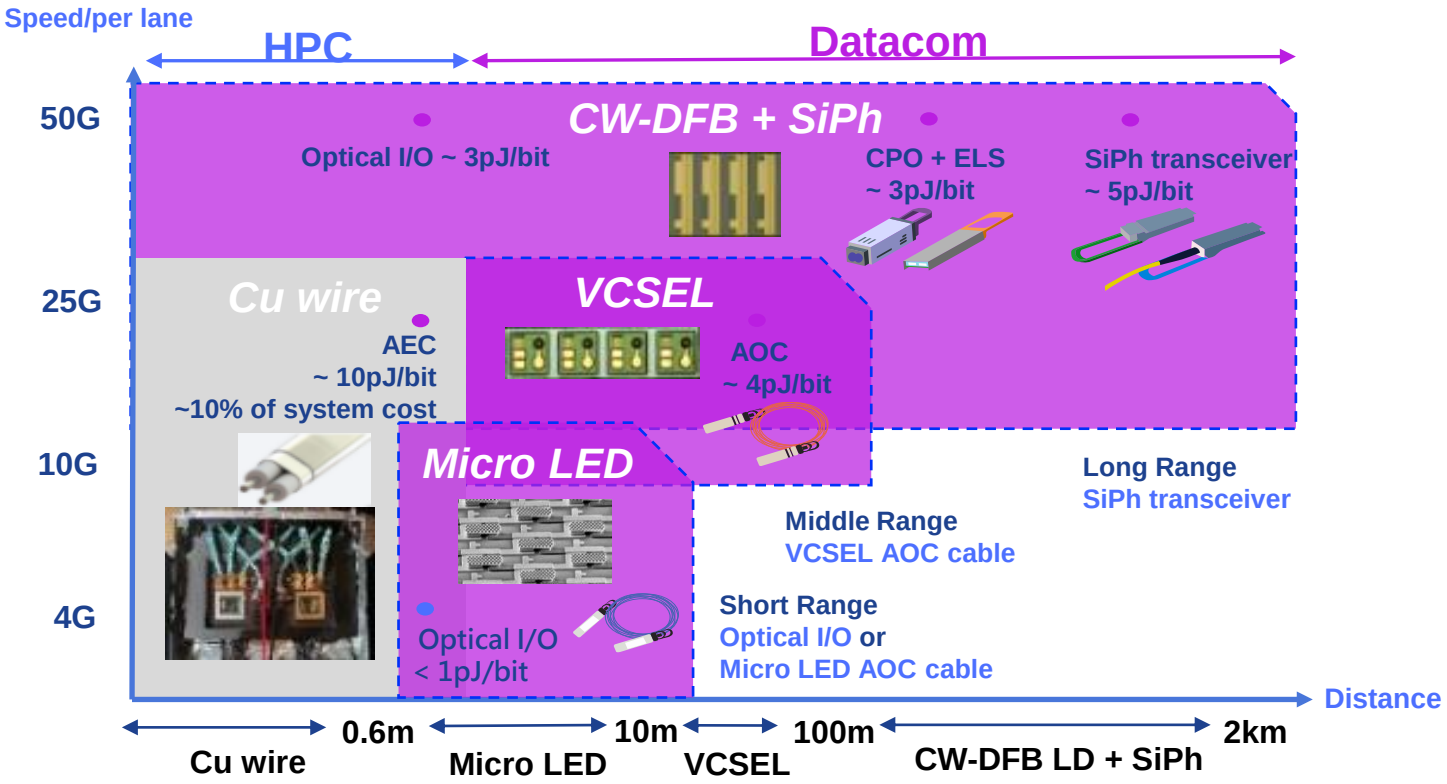
As AI applications expand, global data traffic is expected to grow sevenfold by 2028, driving the demand for high-speed transmission. Traditional copper wire technology is limited by energy consumption and bandwidth, while optical interconnect, with its advantages of single-channel multi-wavelength and multi-channel high bandwidth, is poised to become the new technology for high-speed transmission. Leveraging its expertise and experience in III-V semiconductor materials and processes, Ennostar is actively developing new light sources such as VCSEL, CW-DFB LD, and Micro LED to achieve high-efficiency, low-power transmission. This will meet the needs of AI training and data center transmission, accelerate cloud and IoT applications, and drive a new era of information transmission revolution.

### Optical Interconnects are the Key Answer for Transmission in AI Era



# AI Optical Interconnects

## Positions of Three AI Optical Interconnect Technologies



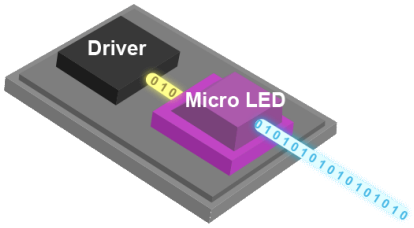

## Advantages of Three AI Optical Interconnect Technologies

Ennostar

| Item | Electrical | Micro LED | VCSEL | CW-DFB LD |
|---|---|---|---|---|
| Max. reach (m) | 1 | 10 | 100 | 2000 |
| Link energy (pJ/bit) | > 10 | <1 | 4 | 5 |
| Max. operating temp (°C) | 125 | 125 | 85 | 75 |
| Pre-FEC bit error ratio | $10^{-18}$ | $<10^{-12}$ | $2.4 \times 10^{-4}$ | $2.4 \times 10^{-4}$ |
| Redundancy | N/A | Yes | N/A | N/A |
| Latency | Low | Low | Medium | Medium |
| integration with CMOS | Easy | Easy | Medium | Hard |
| Relative Cost (Per bit) | Low | Low | Medium | High |

# AI Optical Interconnects

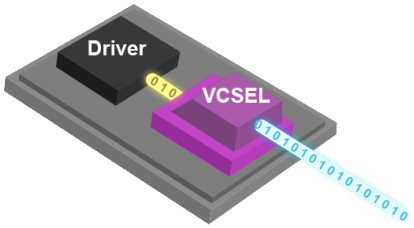
## Advantages of Three AI Optical Interconnect Technologies




### Micro LED (Best Cost-Effectiveness for Transmission within 10 Meters)

**< 10 m**
**125 °C**
**30,000hr**
**1 pJ/bit**

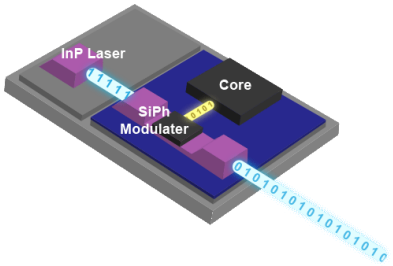
- Low cost
- High temperature resistance
- Long lifespan
- Low energy consumption




### VCSEL (Best Cost Efficiency for Mid-Range Transmission)

**< 100 m**
**85 °C**
**5,000hr**
**4 pJ/bit**

- The most widely used optical source
- A mature supply chain
- Easier optical integration




### CW-DFB LD (Efficient Long-Distance Transmission)

**< 2 km**
**75 °C**
**5,000hr**
**5 pJ/bit**

- Paired with silicon photonics for broader coverage
- Semiconductor silicon photonics ecosystem is stronger
- Relatively higher cost

## Ennostar's Three Major AI Optical Interconnect Technologies Development Roadmap from 2025 to 2028

**Micro LED** — 1Gbps — 4Gbps — 6Gbps — 8Gbps →

**VCSEL** — 50Gbps — 100Gbps — 200Gbps →

**CW-DFB LD** — 70mW — 100mW — 150mW — 200mW →