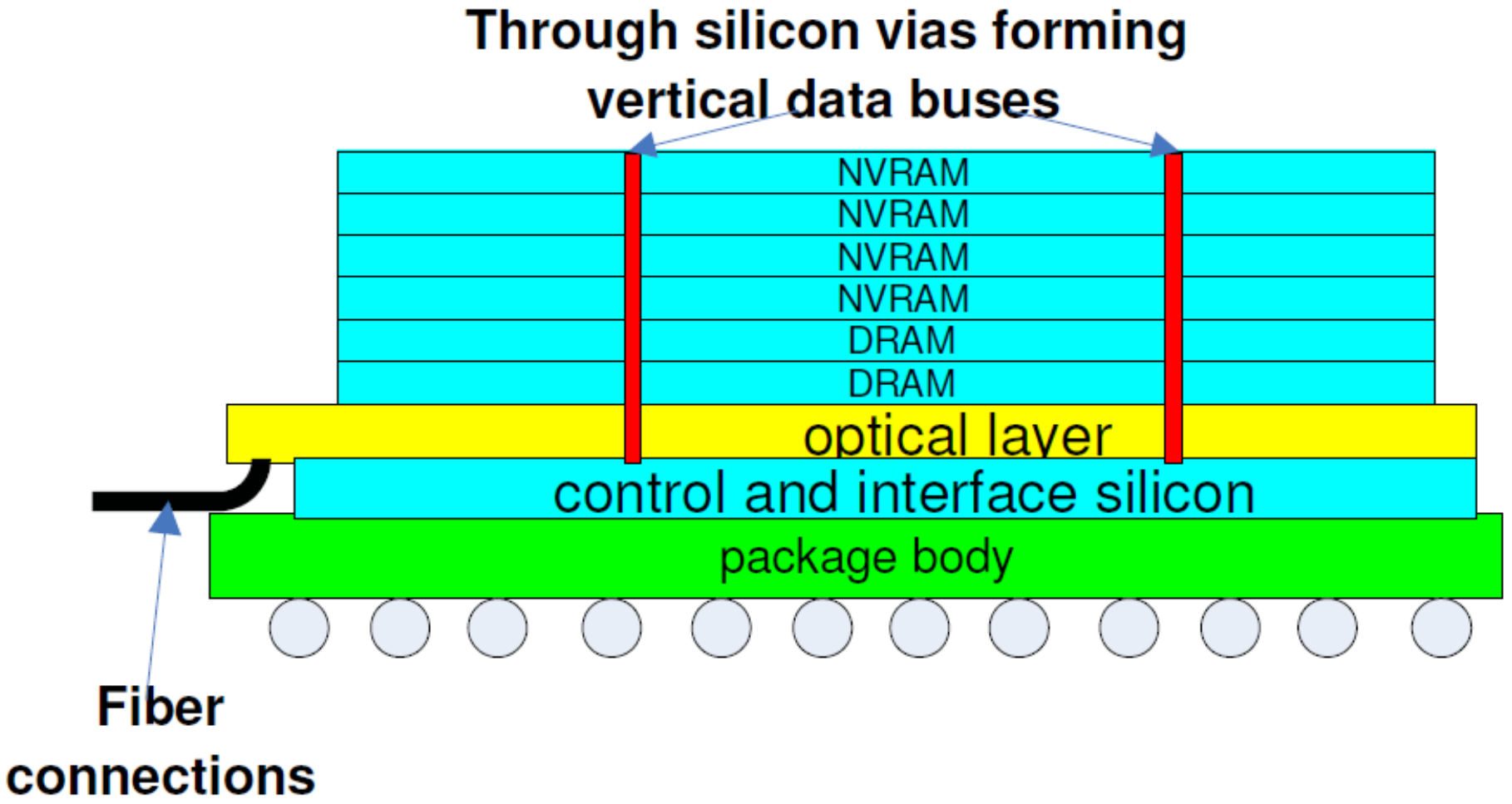
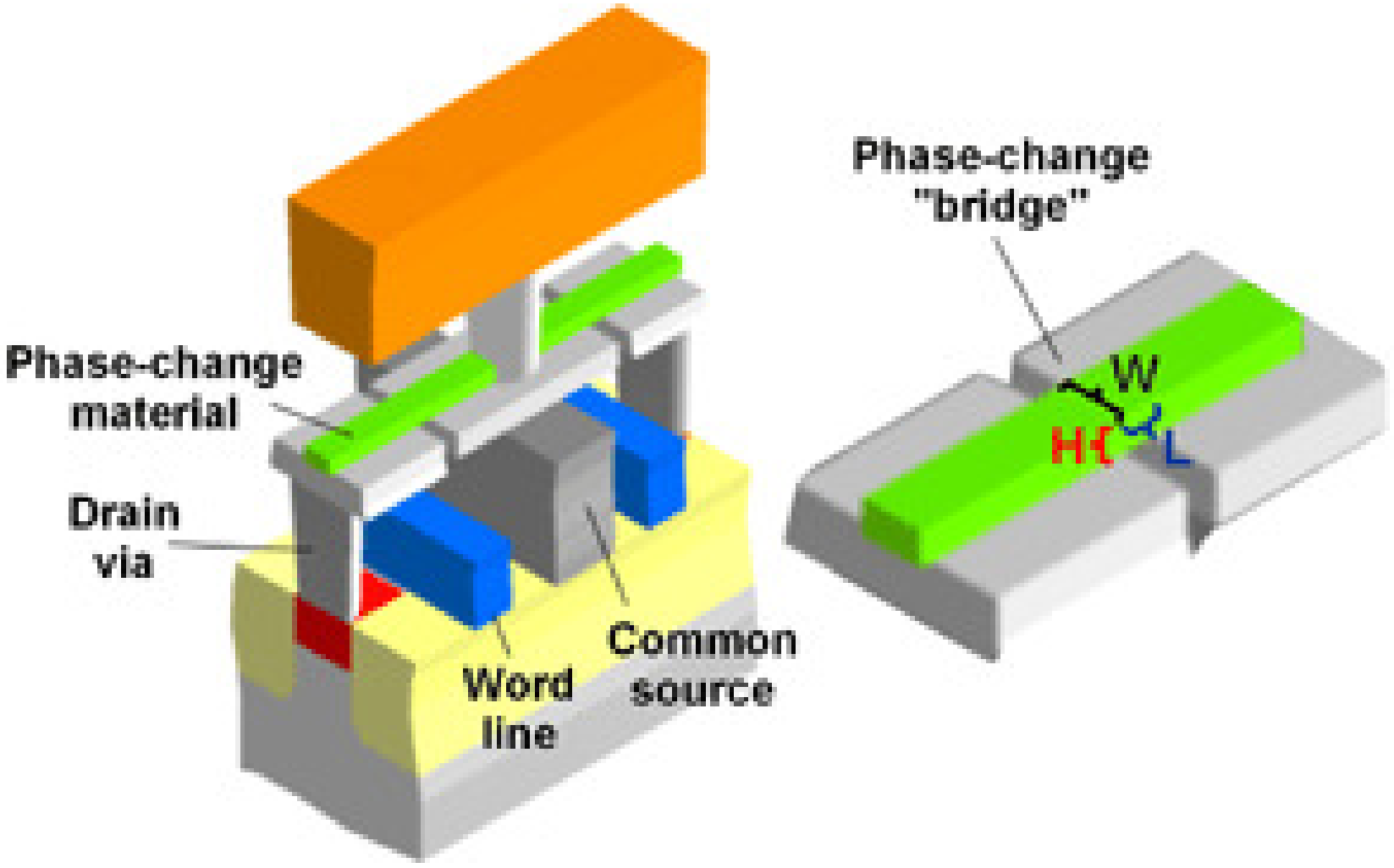
RUMP session

Conference synthesis (RUMP session)

- **Eveything has to be in CMOS – however, can it lase?**
- **Vertically integrated company needed to 'make it happen' – However, there is no such company (anymore) on the planet**
- **Listen to your customers to 'make it happen'**
- **10x performance improvement for 10x less cost needed to startup company**
- **Single mode mode for scalability**
- **10x power savings possible for DRAM memory with optical attachment**
- **Two key datacenter disruptions: PCM and 3D packaging**
- **BW bottlenecks are the VALUE points (where industry makes money!)**
- **The DATA is the problem and not the compute (data at rest tends to stay at rest)**
- **Internet / Datacenter switching: solve a global problem with local info and decision**
- **Internet architecture moves to DC, DC architecture moves to chip level!**
- **Need Photon source as wall socket, just like we have electrons from wall**


Through silicon vias forming vertical data buses
NVRAM
NVRAM
NVRAM
NVRAM
DRAM
DRAM
optical layer
control and interface silicon
package body
Fiber connections


Phase-change material
Drain via
Word line
Common source
Phase-change "bridge"
W
H
L

Roadmap for Convergence

	Components	Architecture	Manufacturing
Today			
Trend	integration CMOS	programming power efficiency performance	high volume low cost
Ideal			

Figure-of-Merit for Communication

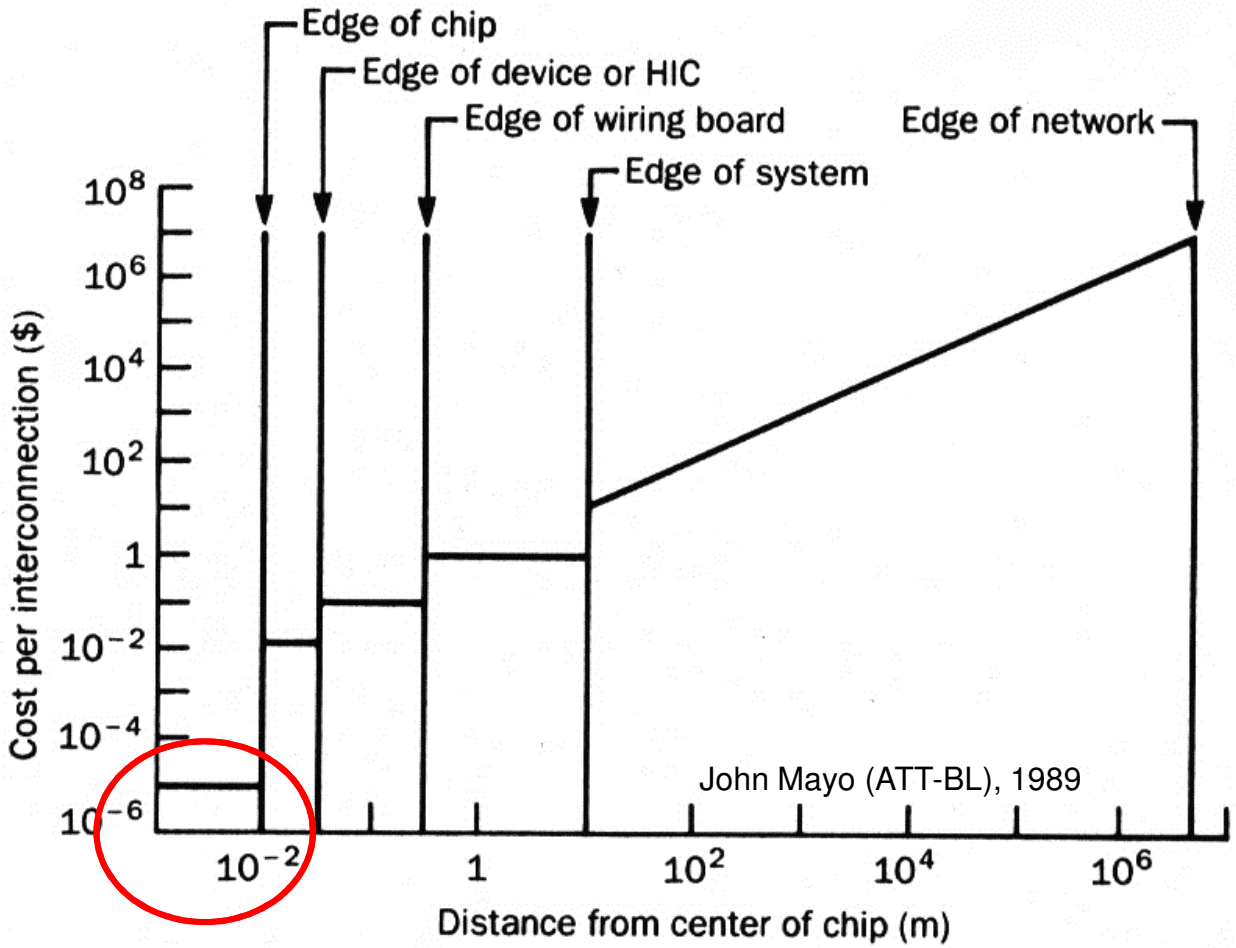
$$\frac{(content)}{(cost \times latency \times energy \times footprint)} =$$

$$\frac{bits}{(\$ \times sec \times J \times cm^3)}$$

David Miller

- All that matters is bit per Joule…

Interconnection Economics



Monolithic chip-level integration can reduce cost and support complexity. Photonic integration can be power efficient with low EMI.