

Serial Physical Layer Approach for 10GbE

***Edward Cornejo
Optoelectronics Development
Austin, TX
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610-391-2116***



Outline

- Reasons for considering a serial stream approach
- 10 Gigabit Optoelectronics status
- Migration path for 10 Gigabit solutions
- Preliminary 10GbE Physical Layer requirements
- Relative Price Curve
- Summary



Reasons for Considering Serial 10Gbps Approach

- Single channel solutions should intrinsically cost less than multiple channel solutions
- Optics and electronics technology are here
 - Optics vendors switching to uncooled optics for emerging data applications
 - Electronics vendors moving to SiGe to reduce price and power dissipation
- Can use existing SMF with longwave optics to meet all Vertical Riser, Campus, and WAN distance requirements

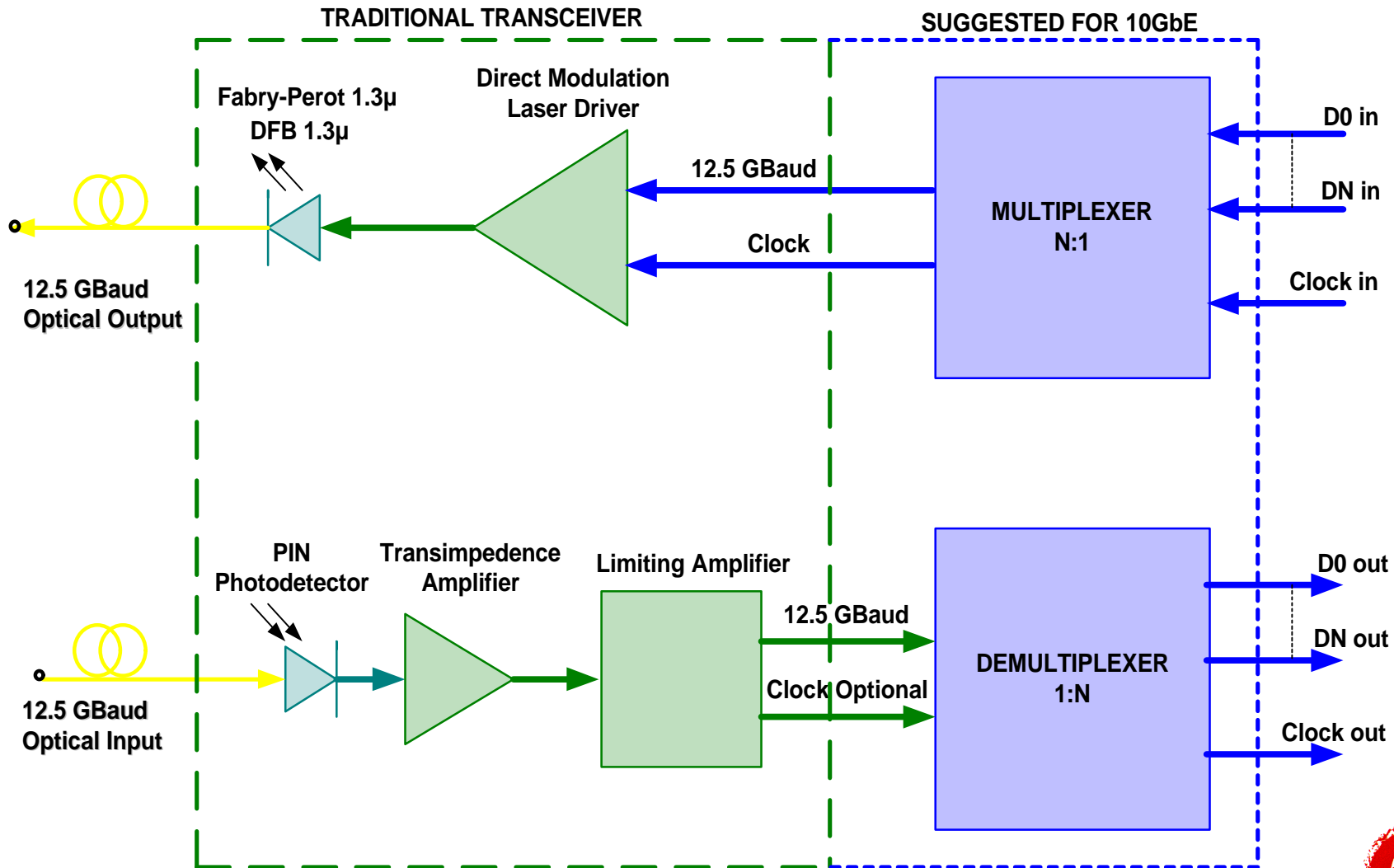


10 Gigabit Optoelectronics Status

Component	Technology	Availability	Data Rate Capability	Distance
Laser	EML	NOW	10Gbps	80km
Laser	CW ILM/LiNbO ₃	NOW	10Gbps	600km
Laser	Ucooled Fabry-Perot	Jun-99	12.5Gbps	1km
Laser	Ucooled DFB	Jun-99	12.5Gbps	10km
Photodetector	PIN	NOW	12.5Gbps	NA
Photodetector	APD	NOW	12.5Gbps	NA
Driver	GaAs	NOW	10Gbps	NA
Driver	SiGe	Dec-99	12.5Gbps	NA
TIA	GaAs	NOW	12.5Gbps	NA
TIA	SiGe	Dec-99	12.5Gbps	NA
Limiting Amp	GaAs	NOW	12.5Gbps	NA
Limiting Amp	SiGe	Dec-99	12.5Gbps	NA
CDR	GaAs	NOW	12.5Gbps	NA
CDR	SiGe	Dec-99	12.5Gbps	NA
Mux/Demux	GaAs or Bipolar	NOW	10Gbps	NA
Mux/Demux	SiGe	Dec-99	12.5Gbps	NA



Transceiver Migration for 10 Gigabit Data



Preliminary 1km Requirements

Fabry-Perot(MLM) 1310nm			
	Min	Max	Units
Transmitter			
Signaling Speed		12.5	GBd
Average Power	-5	0	dBm
Wavelength	1290	1330	nm
RMS Spectral Width		3	nm
Extinction Ratio	9		dB
10%-90% Rise/ Fall Time		35	psec
Relative Intensity Noise		-125	dB/Hz
Receiver			
Signaling Speed		12.5	GBd
Wavelength	1290	1330	nm
Average Receive Power		0	dBm
Receiver Sensitivity	-14		dBm
Return Loss			

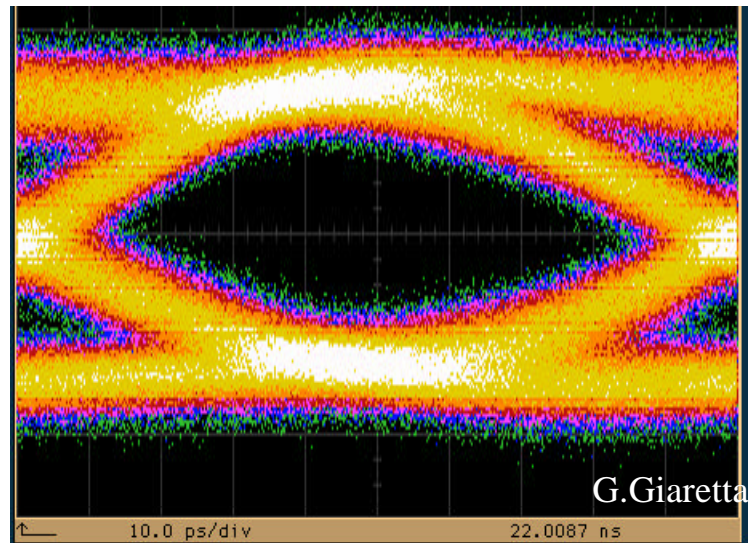


Preliminary 10km Requirements

Distributed-Feedback(SLM) 1310nm			
	Min	Max	Units
Transmitter			
Signaling Speed		12.5	GBd
Average Power	-5	0	dBm
Wavelength	1290	1320	nm
RMS Spectral Width		0.5	nm
Side Mode Supression	30		dB
Extinction Ratio	9		dB
10%-90% Rise/ Fall Time		35	psec
Relative Intensity Noise		-145	dB/Hz
Receiver			
Signaling Speed		12.5	GBd
Wavelength	1290	1330	nm
Average Receive Power		0	dBm
Receiver Sensitivity	-14		dBm



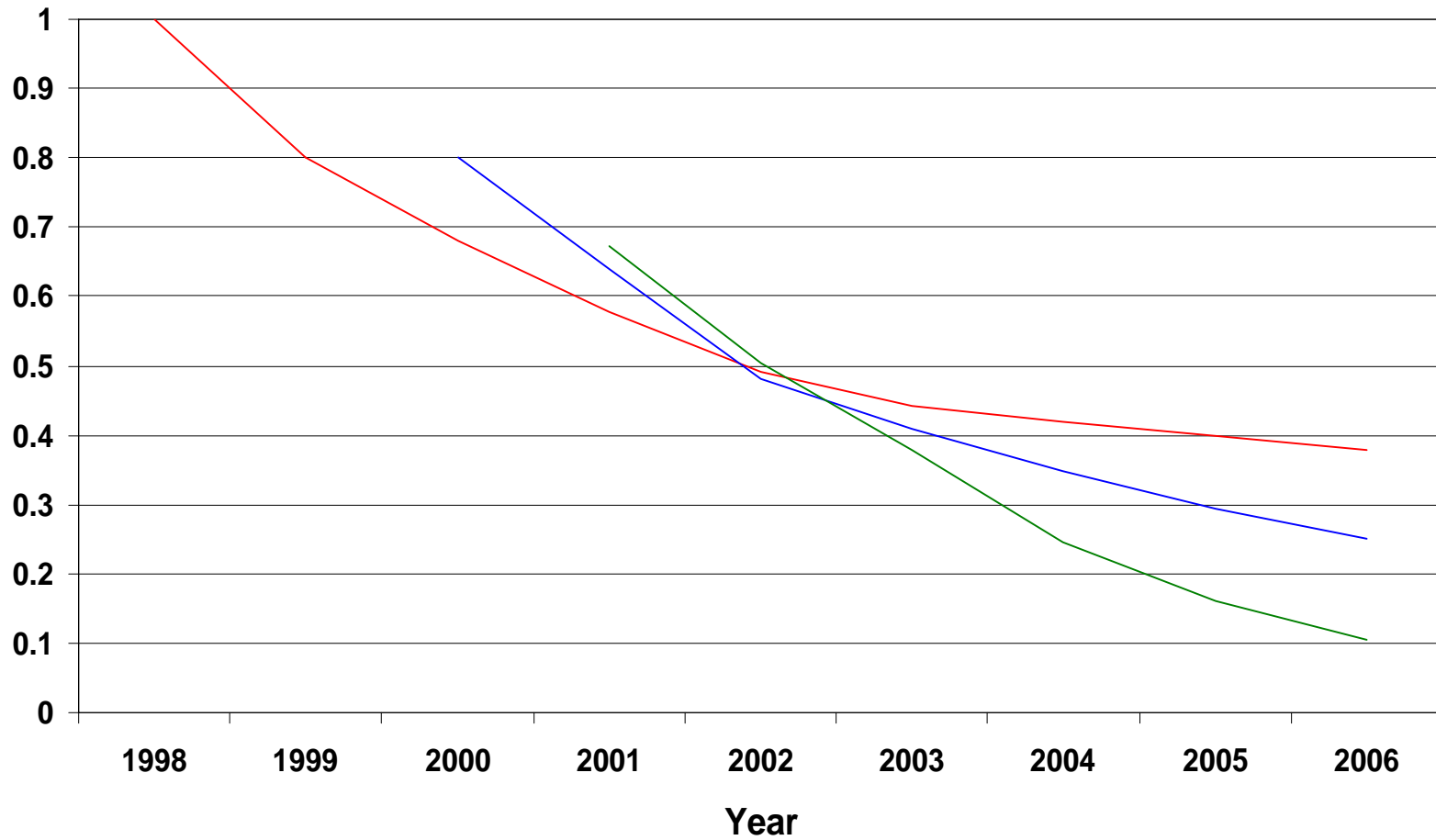
10Gbps Transmission using uncooled, unisolated, FP laser



3km Single Mode Fiber



Price Curve for 10 Gigabit



— Current Solution — XCVR w/SerDes I — XCVR w/SerDes II



Summary

- Serial 10 Gigabit optoelectronics solutions exist today from multiple vendors
- Further integration is recommended to minimize OEM's burden of routing high frequency signals
- Serial 10 Gigabit approach is clean and should be considered as an option for the 10GbE physical layer



Optical Physical Layer Summary

- HP, Lucent, Nortel, and Siemens all concur that the optoelectronics solutions are viable today that can support existing SMF and MMF

