VCSEL-based Solutions for 10 Gigabit Ethernet

W.L. Gore & Associates

Richard Kriese

Mark Donhowe

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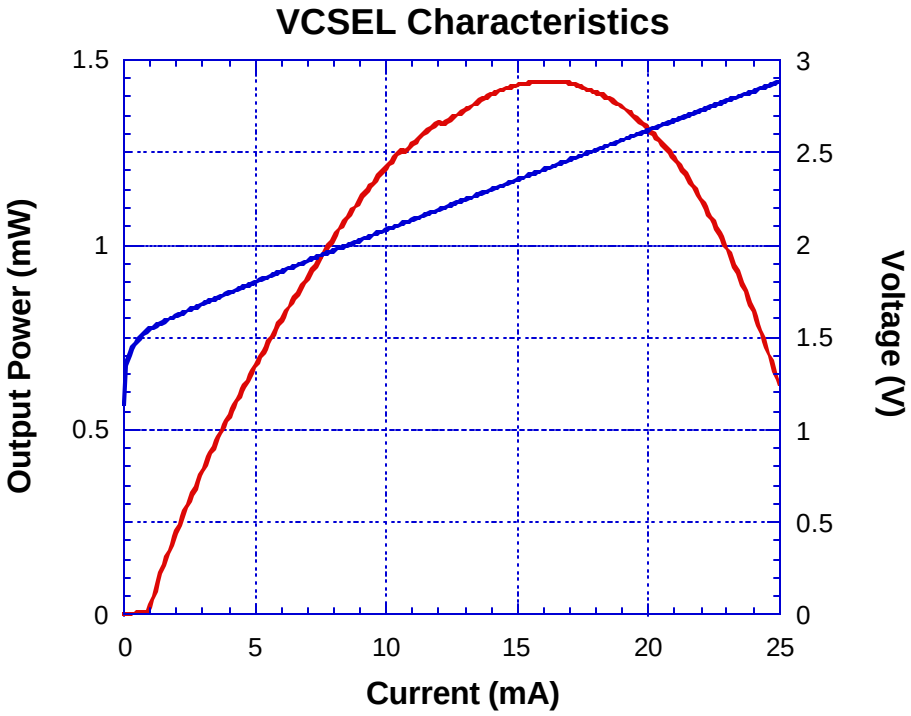
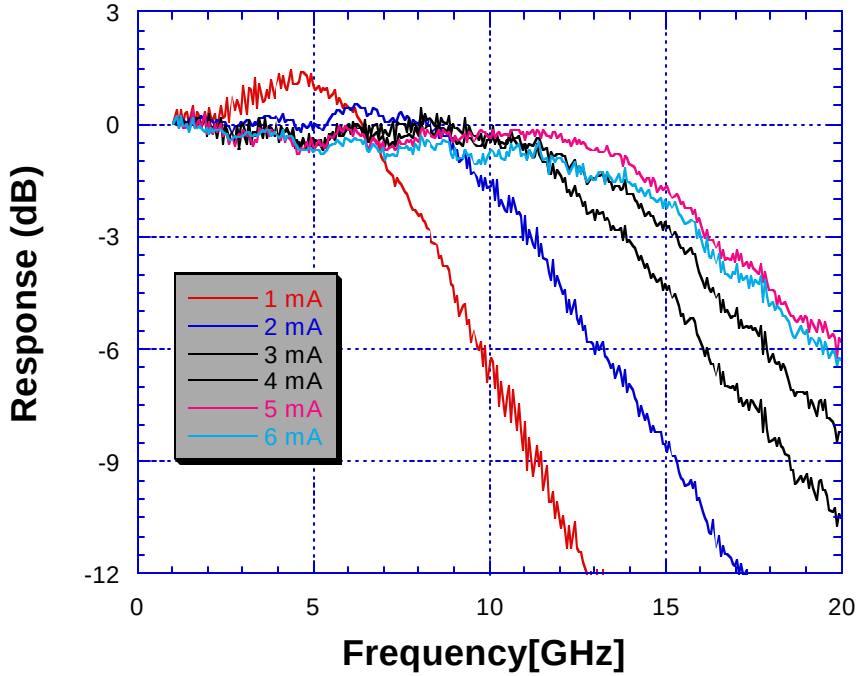
Outline

1. *High speed 850nm VCSELs.*
2. *Possible SW-VCSEL based solutions.*
3. *High speed 1300nm VCSELs.*
4. *Possible LW-VCSEL based solutions.*
5. *Conclusion.*

High Speed 850nm VCSELs





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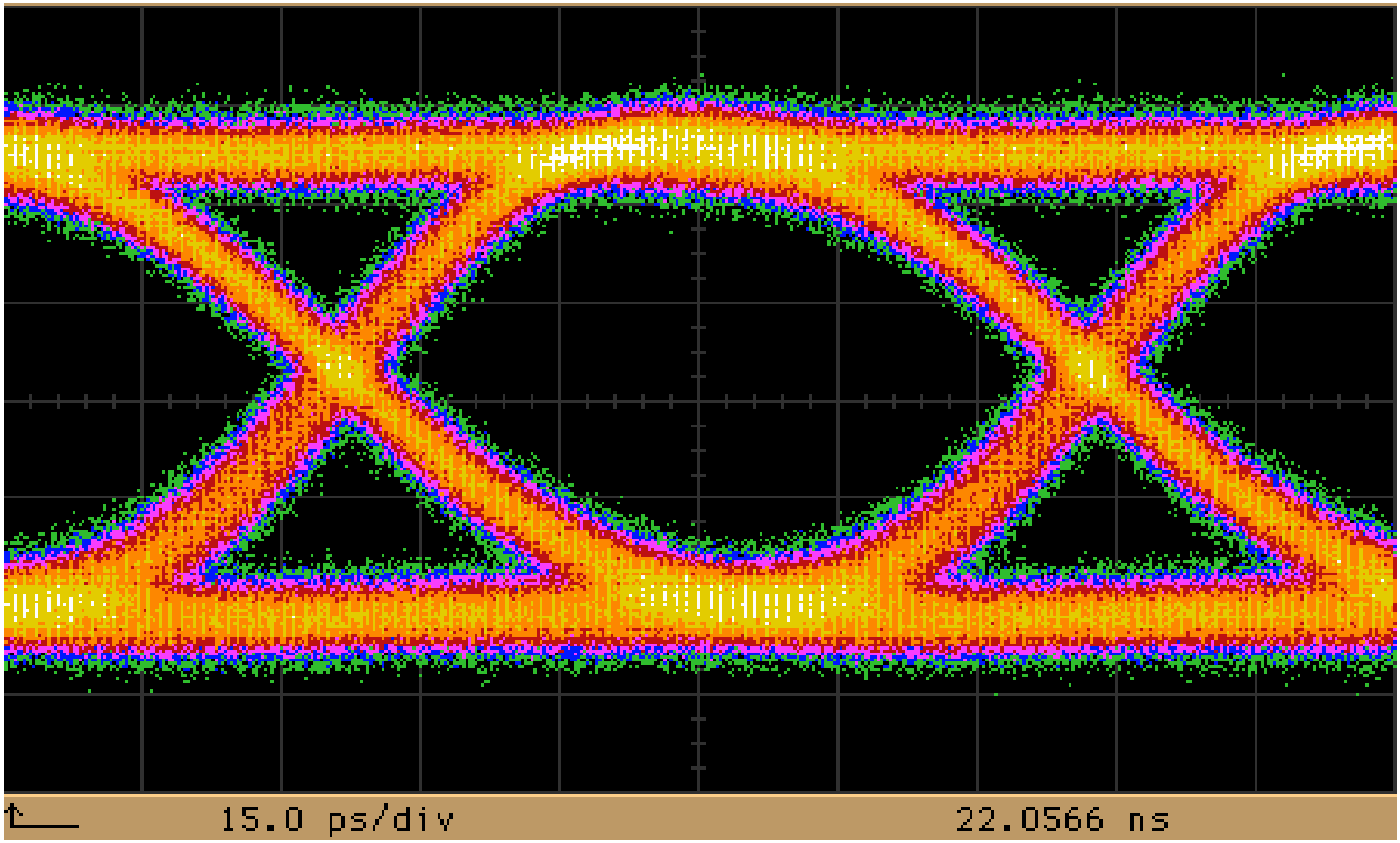
12.5 Gbit Eye



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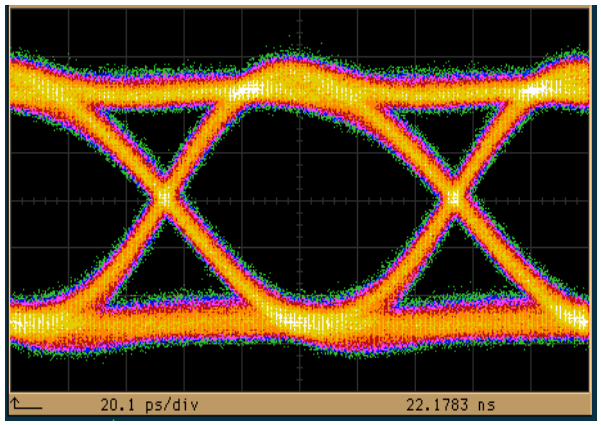
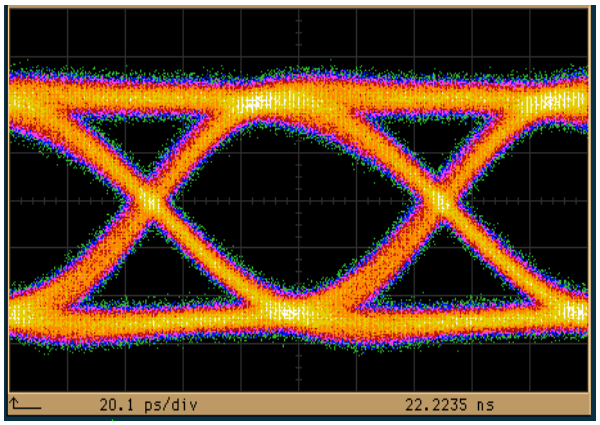
Gore 850 nm VCSELs With High BW MMF 10 Gb/s Eye Patterns

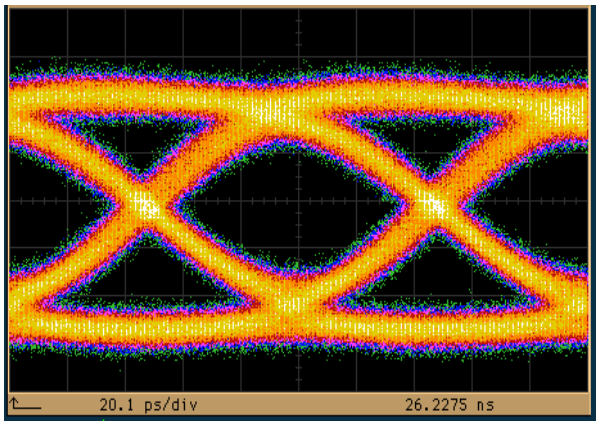
1 meter length



300 meter length



600 meter length



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IEEE 802.3
Higher Speed Study Group
November 1999

Possible SW-VCSEL Solutions

1. *10-wide 850nm MMF at 1.25 Gbps.*
2. *4-wide 850nm MMF at 3.125 Gbps.*
3. *1-wide 850nm MMF at 12.5 Gbps.*

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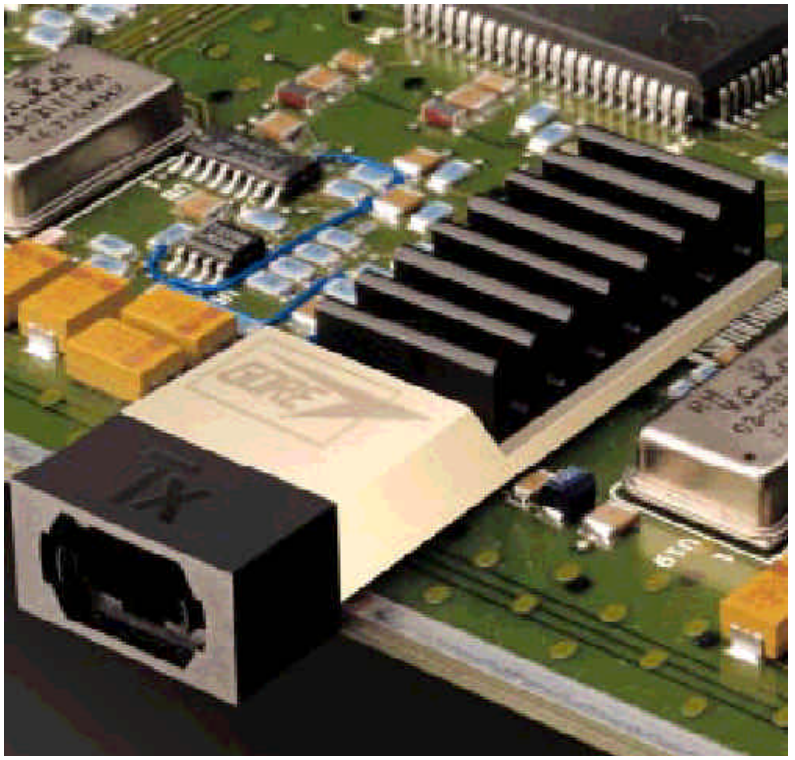
12-wide Parallel Transmitters and Receivers

- *850nm VCSEL arrays*
- *MTP connector*
- *IEC class 3A, FDA class I*
- *1000Base-SX performance*
- *802.3ad opportunities*
- *Moving to higher data rates next year*



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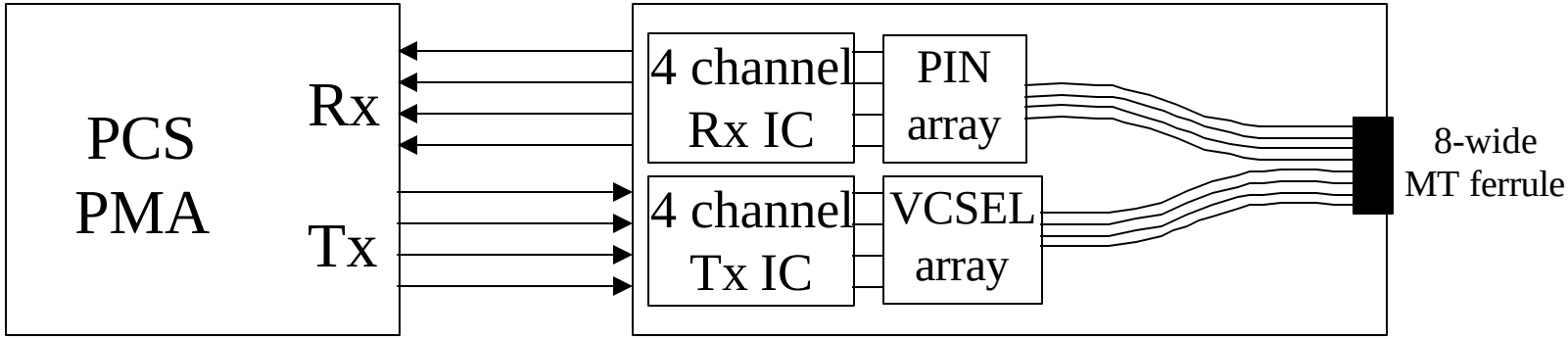
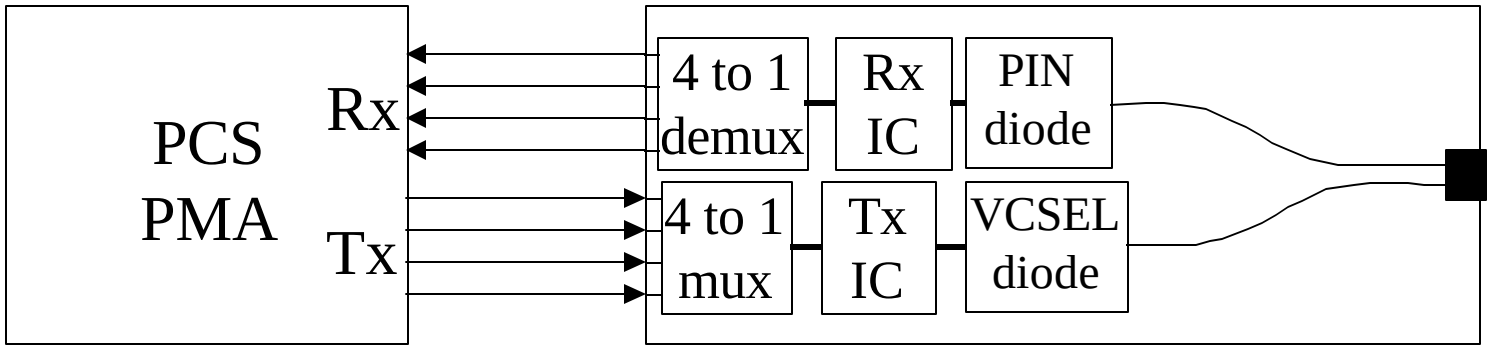
4 by 4, 3.125 Gbps 300m Parallel Solution



- *850nm, 50um ribbon fiber, Class I eye safe.*
- *300m with higher bandwidth GbE fiber.*
- *Could use same electrical I/O as coarse WDM.*
- *Low cost packaging ("parallel advantage", no serdes)*
- *Scalable to higher data rates.*

850 nm 12.5 Gbps 300m Serial Solution



- *High BW 50um fiber from Corning and Lucent.*
- *Have demonstrated over 500m in lab.*

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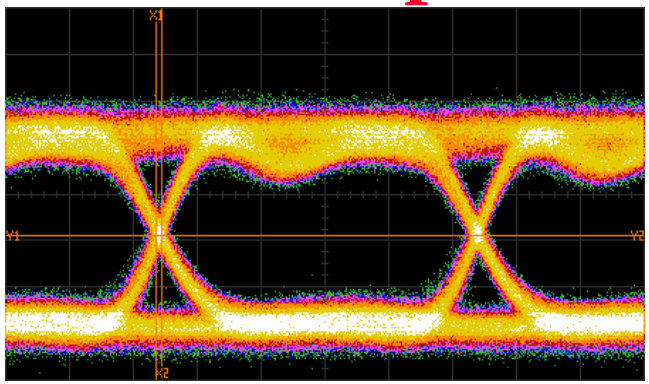
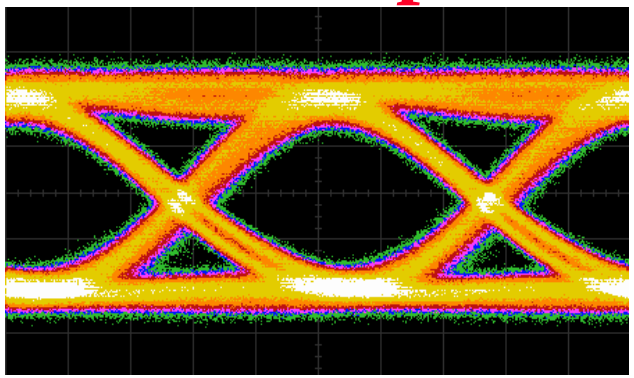
LW-VCSEL Eye Diagrams

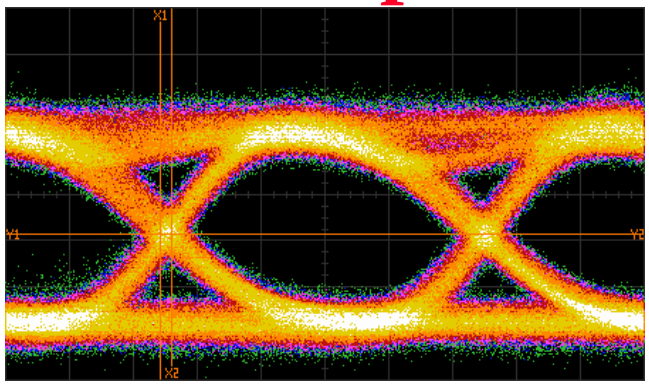
1.25 Gbps



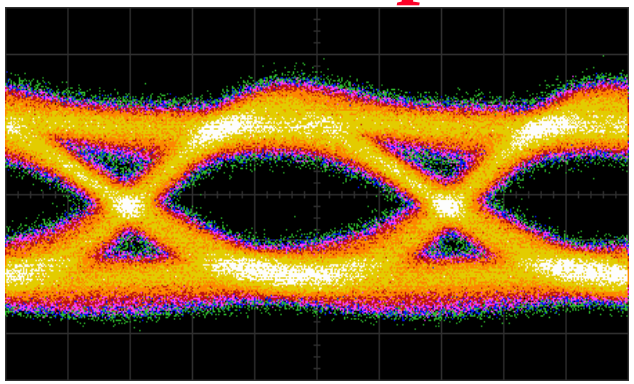
4.0 Gbps



2.5 Gbps



7.0 Gbps



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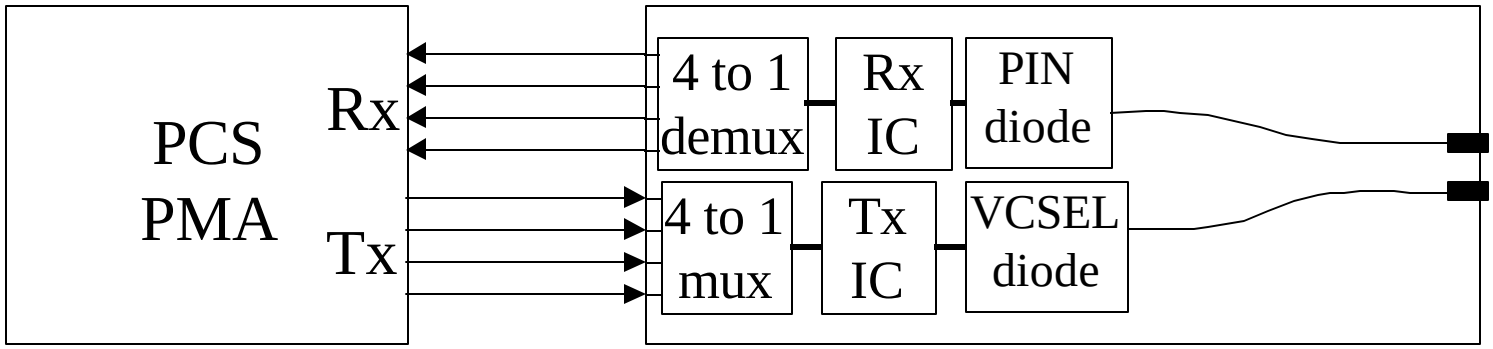
LW-VCSEL 12.5 Gbps 2,10 Km Serial Solution



- *DFB-like performance at projected lower cost.*
- *Potential for one 1300nm part for 2km, 10km objectives.*
- *40km objective under study (cooled? 1550nm?)*

Conclusion

- *Short wavelength and long wavelength VCSEL technologies are feasible for 10Gb.*
- *Gore is looking forward to partnering and working with other companies to make 10GbE a reality.*

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