Center Wavelength Specification for Automotive Links (in support of Comment R1-67)

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Multi-Gigabit Optical Automotive Ethernet

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Supporters

VCSEL

Vipul Bhatt	Coherent (formerly II-VI)
David Lewis	Lumentum
Nikolay Ledentsov	VI Systems
Ken Jackson	Sumitomo
German Feyh	Broadcom

OEM

Hideki Goto	Toyota
Naoshi Serizawa	Yazaki
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Masato Shiino	Furukawa Electric

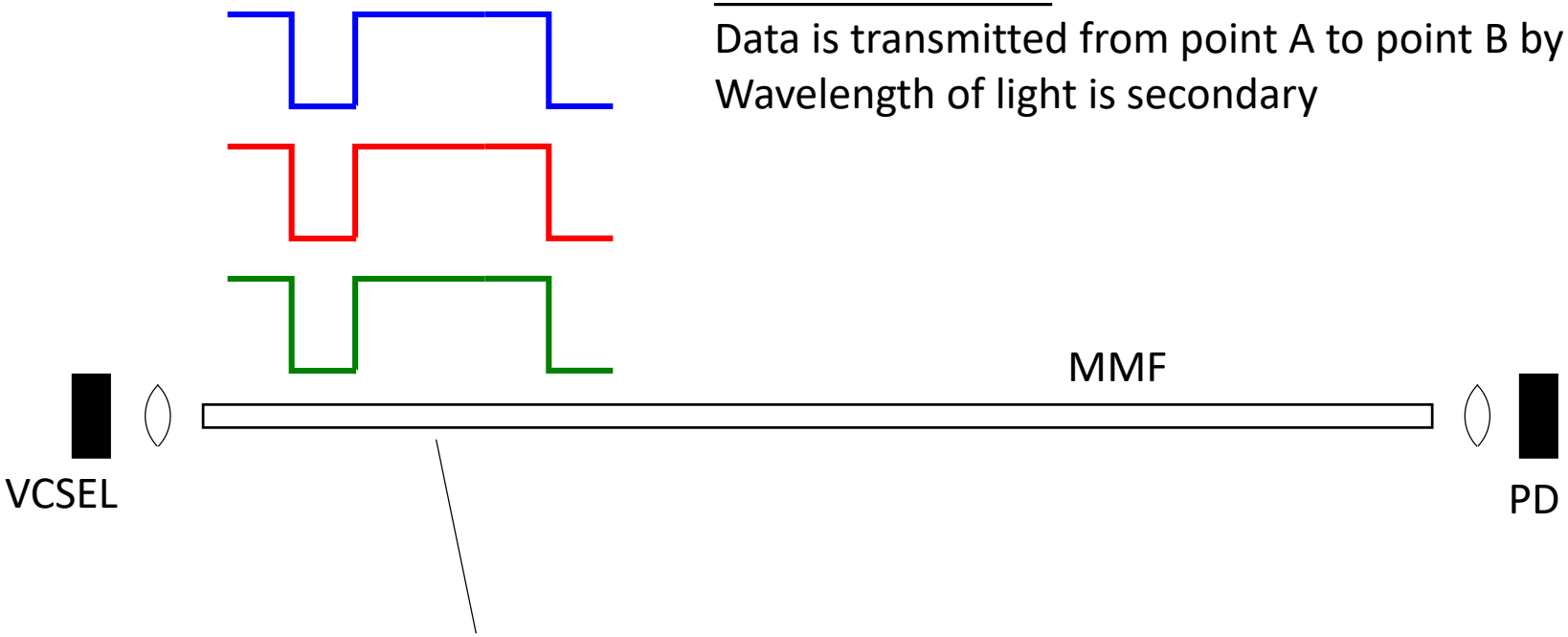
Academic

Managu Kagami	Nagoya Inst. Technology
Atsushi Kanno	Nagoya Inst. Technology

Fiber

Mabud Choudhury	OFS

Automotive Optical Link



Data Transmission

Data is transmitted from point A to point B by “modulating” the light

Wavelength of light is secondary

Channel

The “waveguiding” property of the fiber is utilized in transmitting data from point A to point B

Dispersion of the fiber is secondary

Presentations on VCSELs of Different Wavelengths

These presentations show VCSELs of different wavelengths can meet the requirements of automotive links.

850 nm

Mirko Hoser, “850 and 910 nm VCSELs for POF automotive links,” Hoser_3dh_220824.pdf

N. Ledentsov, Jr., “Technical feasibility and reliability of quantum-dot 850-nm VCSELs operating up to and above 25Gbaud with a high temperature stability beyond 150°C,” ledentsovJr_OMEGA_01_280420_VCSEL.pdf

Laura Giovane, “850 nm 25G VCSEL reliability,” giovane_3cz_01_080621.pdf
Ramana Murty, “850 nm VCSEL for GI POF links,” murty_3dh_01a_220713.pdf

910 nm

Mirko Hoser, “850 and 910 nm VCSELs for POF automotive links,” Hoser_3dh_220824.pdf

Presentations on VCSELs of Different Wavelengths

940 nm

David Lewis, “Extending wavelength for –VR PMD,” lewis_3db_01_070121.pdf

980 nm

Roger King, “VCSEL design for automotive datacom Experimental results for 980 nm versus 850 nm,” king_3cz_01a_0521.pdf

Reflector Message

Dear 802.3cz Task Force participants,
I am expressing an opinion regarding the subject matter of comments I-107 and I-108 against 802.3cz D3.0. I am very concerned about the REJECT response.
The automotive industry will benefit from the participation of multiple VCSEL suppliers. The short optical links can be served by VCSELs of any wavelength where fiber has sufficient bandwidth. I support expanding the wavelength range to include 850 nm, 910 nm, and 940 nm VCSELs for broad market participation. Virtually all VCSELs made for datacom are at 850 - 940 nm with more than two decades of operation in the field.

A lot of discussion has focused on reliability. Both Mirko Hoser (affiliated with Coherent Corp) and Ramana Murty (affiliated with Broadcom) have presented the excellent reliability of 850 nm VCSELs. Both show lifetime with margin for the automotive application. The reliability calculations presented by Ramana make the point that VCSELs are screened for lifetime and that is accurate.

Multiple presentations on 850 and 910 nm VCSELs have shown they meet the requirements of automotive links.

Several statements in the response to the comment I-108 are demonstrably inaccurate. 850 nm VCSELs do not need to be biased below 5 mA to achieve a long lifetime and there is no difficulty in achieving performance over -40 deg C to 125 deg C. Also, our experience with commercial implementation of SWDM transceivers has proven that there is no adverse impact on manufacturing or testing cost for receivers designed to accept a wide range of wavelengths.

It is difficult enough to predict the future. Restricting our implementation options unnecessarily is not a wise decision.

Best Regards,
Vipul Bhatt
Affiliation: Coherent Corp

Center Wavelength Options

A specification that meets where VCSELs have been optimized (850/910/940/980 nm) ensures that the most *field tested* VCSELs are used for automotive links.

Option A: Two bands

a) 840 – 950 nm [receivers are increasingly being specified for this wavelength range in Datacom standards]
b) 970 – 990 nm

Option B: Single band

840 – 990 nm

Summary

Majority of VCSELs used for data links today are in the 840 – 950 nm range. A wide band for center wavelength is supported by many in the data communications industry.

Adopting either of the two options on slide 6 ensures the most field tested VCSELs are used for automotive links.