A PMD for P2P links:
Single or Dual Wavelength?

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Cannata, Mark – Marconi

Effenberger, Frank – Quantum Bridge

Ivry, Raanan – Broadlight

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Kleiner, Norbert – Motorola

Lavasani, Javad – Maxim

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Introduction

Laser choices for single and dual wavelength single fibre P2P links

	1 Wavelength	2 Wavelength
Today	Two FPs at 1310 nm	FP at 1310 nm DFB at 1550 nm
Future	Two FPs/VCSELS at 1310 nm	FP and VCSEL or two VCSELs

We will show that a 1 wavelength PMD is the best solution for P2P single fibre links

Reflectance Issues

Manufacturing data shows same laser performance for 1&2 λ PMDs

	1 Wavelength	2 Wavelength
Laser	✓	✓
Receiver	Engineering issue[1]. May require minor changes	✓

Both PMDs operate over 10 km and detect open connector reflections

[1]http://grouper.ieee.org/groups/802/3/efm/public/jul01/presentations/bhatt_2_0701.pdf

Technical presentations from this and previous meetings

Cost Issues - Today

A single wavelength PMD has a significant cost advantage

Estimated Cost Comparison of Modules:

	Today
Single λ PMD TRx	100%
Single λ PMD TRx with full functionality (open connector detect)	100 to 110%
Dual λ PMD (with DFB)	200%

Cost Issues - Future

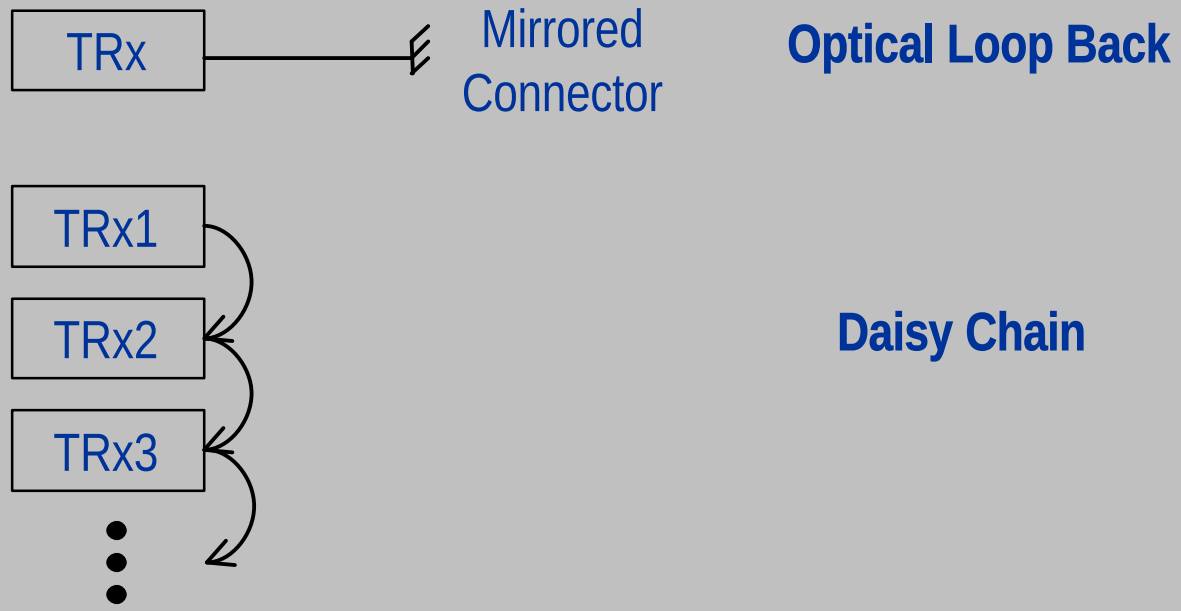
A single wavelength PMD also shows cost benefits in the future

- VCSELs operating at 1310 nm will be more cost effective than 1490/1550 nm because of volume issues which are influenced by PON and other technologies
- Same module for OLT and ONU side and for 100 Mbps and 1 Gbps operation. Once again, volume issues and reduced manufacturing and network provider logistic costs.
- Single wavelength 1310/1310 nm PMD automatically leaves the overlay region free - no cost differential for non-deployment. External WDM coupler or internal filter designs also relaxed compared to P2MP modules because of increased gaurdband.

Testability

Better end point testability with single wavelength PMD

Optical loop-back and ‘daisy-chain’ testing may be performed with single wavelength PMDs at one end of the link. This is not the case for dual wavelength devices.



Field Data - 1

„NBase-Xyplex, a wholly owned division of MRV Communications, Inc., is a leader in providing complete solutions for creating end-to-end managed optical infrastructures. Over the last 3 years, NBase-Xyplex Fiber Driver provided the optical equipment that lighted more than 4,000 single fiber, full duplex , single mode single wavelength optical links using mainly the 1310 nm wavelength. These single fiber, single wavelength links covered distances from 10km to more than 100 km, enabling delivery of wide range of protocols and speeds from T1 (1.54 Mbps), to Fast and Gigabit Ethernet. As of this year, the equipment that lights these single fiber, single wavelength links incorporate sophisticated, yet inexpensive Reflection Detection technologies, that enable extremely fiber efficient network installation and buildup.“

Field Data - 2

„Marconi is a pioneer in the deployment of fiber optics in the last mile portion of the network. Over the past 5 years, Marconi has deployed more than 100,000 single fiber, full-duplex, single mode 1310nm optical links in the access network. As an integral part of the Deep Fiber FTTC system, these optical links have enabled the economical deployment of fiber to within a few hundred feet of each end user served from these networks. A last mile network designed and constructed in this manner enables enormous bandwidth delivery to end users, and, at an installed first cost that rivals the present methods of operation and deployment.“

Summary

1. A single wavelength, single fibre 1310/1310 nm PMD will work over a 10 km P2P link and detect open connector reflections
2. The advent of VCSELs will benefit both single and dual wavelength approaches with a single lambda 1310/1310 nm device having the advantage that higher volumes exist for 1310 nm lasers
3. Today and in the future a cost advantage exists for a single wavelength device compared to a DFB based dual wavelength module
4. Details of networks based upon single wavelength, single fibre PMDs were presented