An Optimised PMD for Single Fibre Point-to-Point Links in EFM

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Introduction

1 Should P2P use the same PMD as P2MP or do we need an optimised PMD?

2 Proposed solution for a P2P PMD:
a single wavelength, single fibre transceiver with

Tx	1310 nm, Fabry-Perot laser
Rx	1310 nm, PiN Diode

3 Open issues

4 Summary

Why have an Optimised P2P PMD?

Because stringent P2MP specs required more costly components

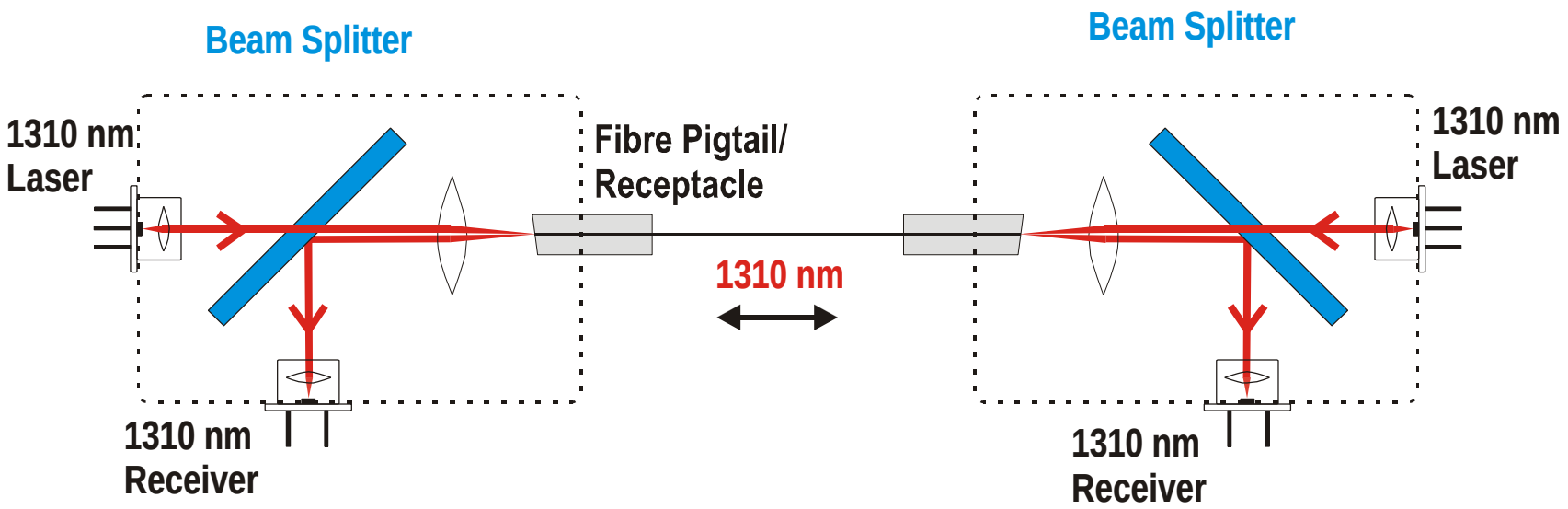
Power budget requirements for 10 km link at 1.25 Gbps:

	P2P	P2MP (1:16)
Link Loss / dB	12	26
Tx Power / dBm	-6(?)	0
Rx Sensitivity / dBm	-18(?)	-26

- **P2P does not need the high power and sensitivity of P2MP.**
- **Lower cost lasers possible for P2P in Upstream and Downstream, not so for P2MP**

Proposed Solution for P2P PMD

Same optical module for OLT and ONU



Integrated beam splitter separates Tx and Rx

Proposed Solution for P2P PMD

Parameters for point-to-point PMD

Table 1 - Optical interface parameters of 1.25 Gbps Point-to-Point Link

Description	ONU/OLT Module	Unit
Signaling Speed	1.25	GBd
Wavelength (range)	1270 to 1360	nm
T_{rise}/T_{fall} (Max, 20%-80% response time)	0.26	ns
RMS spectral width (max)	2.3	nm
Average launch power (min)	t.b.d.	dBm
Extinction ratio (min)	9	dB
RIN (max)	-120	dB/Hz
Receiver sensitivity	t.b.d.	dBm
Return Loss (min)	t.b.d.	dB

Proposed Solution for P2P PMD

Advantages of single wavelength single fibre solution

1. Seperate P2P and P2MP PMD specifications allow for more cost effective components
2. Allows use of more cost effective FP laser sources for Upstream and Downstream
3. Single fibre solution has lower costs than dual fibre for link lengths >1.5 km, see July presentation[1]
4. Identical parts for ONU and OLT side reduces logistics and component costs
5. Same component may be used for 100Base-X links

[1] http://grouper.ieee.org/groups/802/3/efm/public/jul01/presentations/murphy_1_0701.pdf

Open Issues

Future developments of EFM optics

EFM would profit from a transceiver with standardised electrical interface and pinning, similar to SFF for 1000BaseLX (multisourcing possibility and scale effects at manufacturing)

The following should be addressed:

1. **Pinning, packaging and connectors pigtail/receptacle?**
2. **Functions that should be incorporated (P2MP requires additional functions compared to P2P, i.e. burst mode)**

The above issues are outside the scope of this body and the work of an MSA. Existing work on SFF, 1´9 and 2 ´9 provide a usefull starting point for these discussions. A possible solution follows.

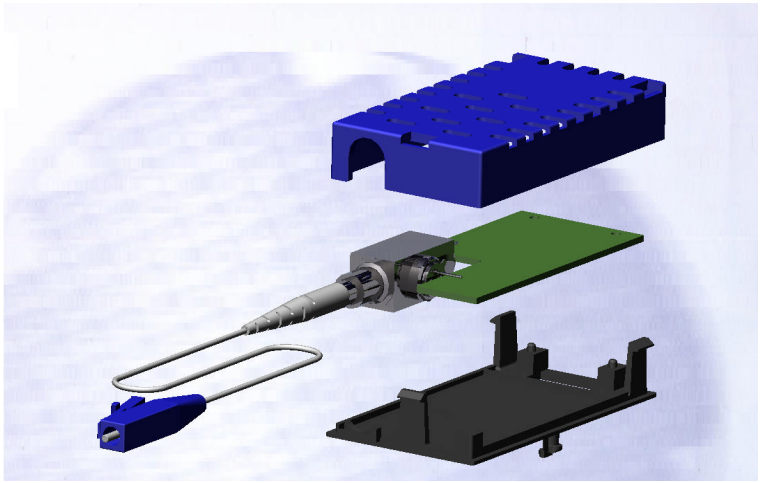
Possible Transceiver for P2P

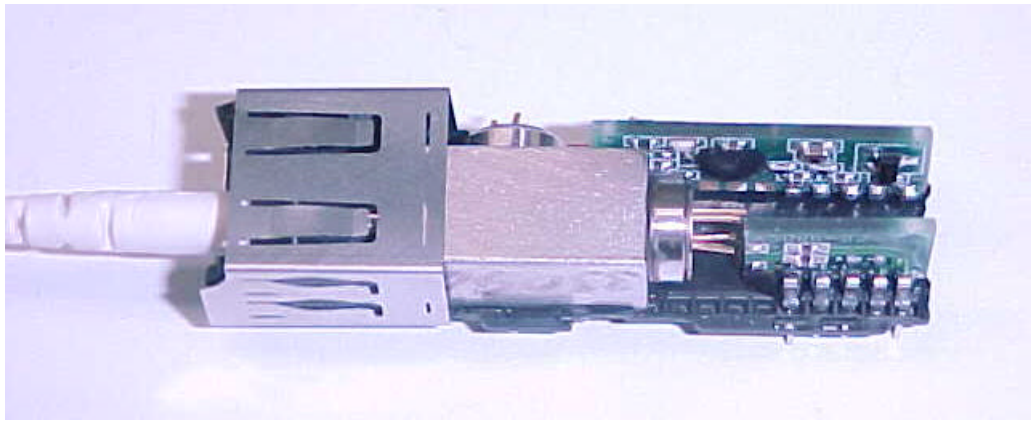
Optics and electronics incorporated into housing

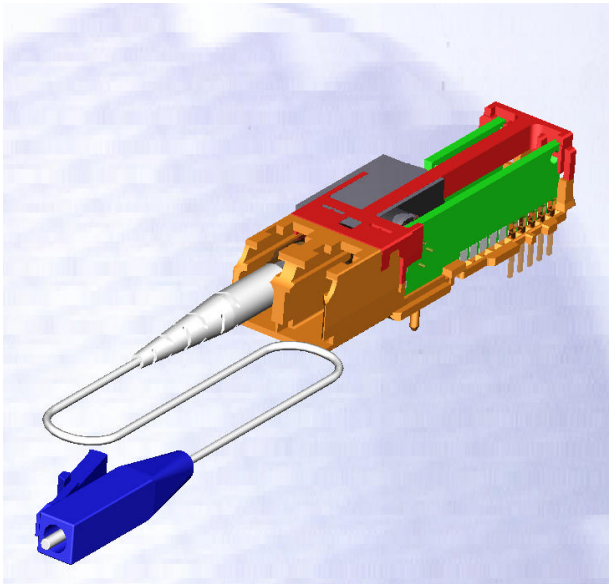
Electronics included:

- **TIA preamplifier**
- **Post amplifier**
- **Laser driver**

1x9 or SFF

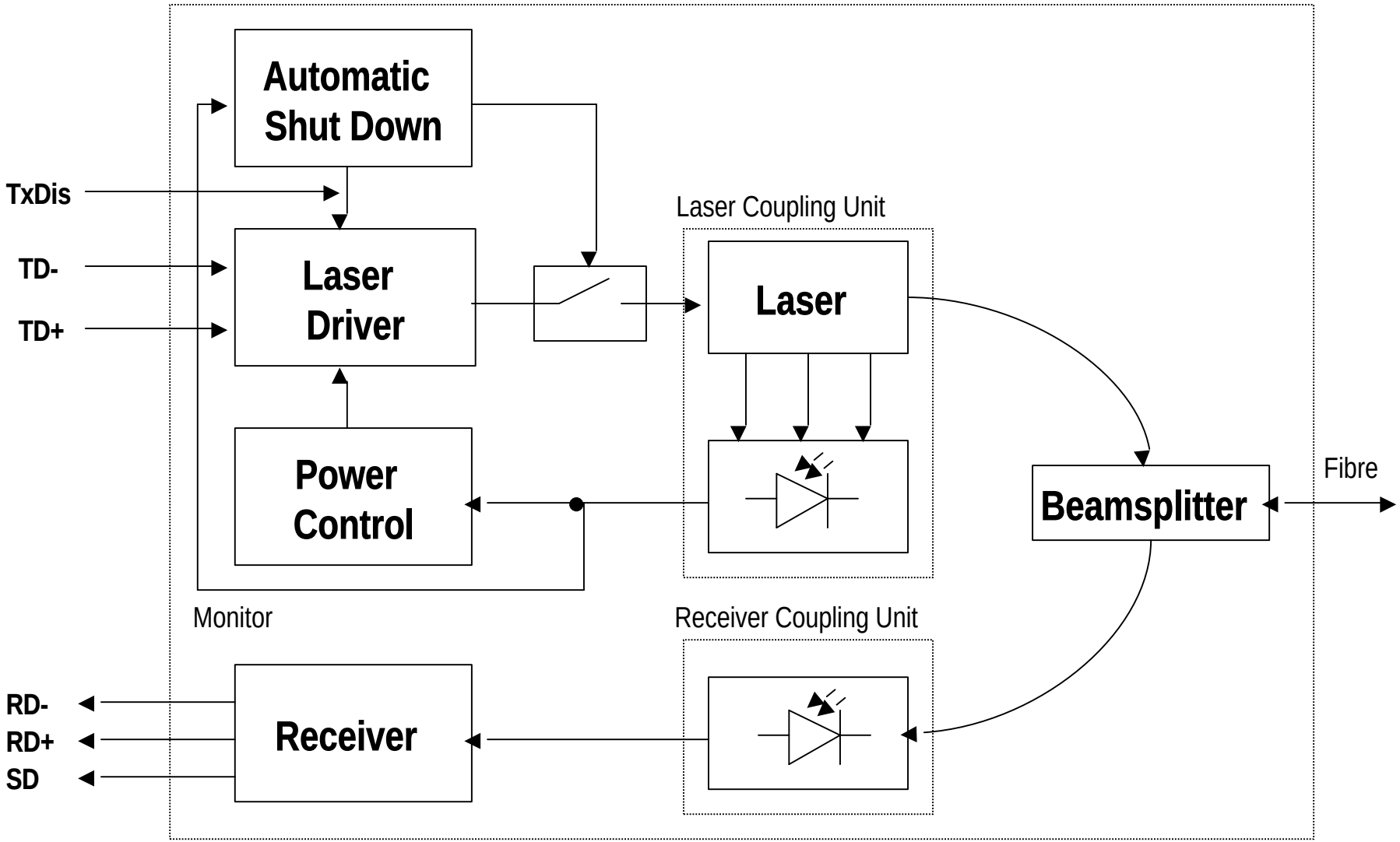






Possible Transceiver for P2P

Block diagram of bi-directional transceiver



Summary

1. An optimised PMD for P2P links implies more cost effective optical components on the ONT and ONU side
2. A proposal for a single wavelength, single fibre PMD solution was presented with
   - Tx: 1310 nm FP Laser
   - Rx: 1310 nm PiN diode
3. We recommend the definition of an EFM P2P (and P2MP) transceiver with a standardised interface. A possible SFF module was presented.