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Ethernet 100 Mb/s Dual SMF PMD

Discussing the physical specification

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Three possible options (at least in principle)

- A: Refer to an existing standard, make formal changes
  (least work, but least probability to yield a useful result)
- B: Refer to an existing standard, make parameter changes
  (more work, but manageable, good probability to yield a useful result)
- C: Create a new, complete, PMD
  (most work, hardly realistic)

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Option A

- **Refer to an existing standard, make formal changes**

Only one existing standard is possible to use with minimal changes:

FDDI SMF-PMD (ANSI X3.184)

Advantages with this option:

Minimum work, small (if any) room for spec disagreements.
Thus it should be the **fastest** route to a standard.
Established test methods and equipment for 100Base-Fx can be used

But there are main disadvantages:

Old standard, not optimized for low-cost utilization of current components
Most **existing** “100Mb” SM TRx **products will not comply**

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Option B

- **Refer to an existing standard, make parameter changes**

  A couple of possible standards exist:

  FDDI SMF-PMD (ANSI X3.184)

  FDDI MMF-PMD (ISO/IEC 9314-3)

  1000Base-LX (IEEE 802.3, clause 38) ?

  SDH/SONET STM-1/OC3 (ITU-T G.957) ??

Advantages with this option (compared to option A):

Will give a more **optimized specification**

The specification can be tailored so that most **existing** "100Mb" SM TRx **products will comply**

Some disadvantages with this option (compared to option A):

More work, more room for spec disagreements

Might be difficult to get **consistency** when making substantial changes but still referring to an external standard

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Option C

- Create a new, complete, PMD

Advantages with this option :

Should give the most **optimized specification**
It should be easier to get **consistency** when embracing the entire PMD
Once completed, it does **not** rely on any **external** standard

Disadvantages with this option:

A lot of work required, and plenty of room for disagreement
Hard to incorporate a complete new PMD **within clause 26**

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Physical parameter considerations

- **Output Power**

Standard	Output Power	
	Min	Max
FDDI SMF Cat I	-20 dBm	-14 dBm
FDDI MMF	-20 dBm	-14 dBm
1000Base-LX	-11 dBm	-3 dBm
STM-1/OC3 S-1.1	-15 dBm	-8 dBm

Suggestion: -20 dBm to -8dBm

(-17 dBm to -5 dBm p-p modulation, c.f. ER discussion on next slide)

\+ Incorporates most existing “100Mb” ranges

– Requires larger receiver overload than FDDI spec

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Physical parameter considerations

- **Extinction ratio**

Standard	Extinction ratio (min)
FDDI SMF Cat I	10 dB
FDDI MMF	10 dB
1000Base-LX	9 dB
STM-1/OC3 S-1.1	8.2 dB

Suggestion: 8.2 dB

(3 dB, in combination with min -17 dBm p-p modulation amplitude)

\+ Simplifies uncooled laser diode control

– Might complicate receiver design

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Physical parameter considerations

- **Receiver sensitivity**

Standard	Input Power	
	Min	Max
FDDI SMF Cat I	-31 dBm	-14 dBm
FDDI MMF	-31 dBm	-14 dBm
1000Base-LX	-19 dBm	-3 dBm
STM-1/OC3 S-1.1	-28 dBm	-8 dBm

Suggestion: -28 dBm to -8dBm
(-25 dBm to -5 dBm p-p modulation)

\+ Lower limit incorporates most existing “100Mb” ranges

− Receiver overload not compatible with FDDI
Only 8dB power budget (still similar to GBE)

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Physical parameter considerations

- **Output waveform**

Standard	Waveform spec
FDDI SMF Cat I	Pulse envelope
FDDI MMF	Pulse envelope
1000Base-LX	Eye mask
STM-1/OC3 S-1.1	Eye mask

Suggestion: STM-1/OC3 Eye mask

+ most existing “100Mb” SM TRx complies
More appropriate than FDDI envelope for laser diodes
Existing SDH/SONET test equipment can be used

– Existing FDDI (Fast Ethernet) test equipment might not be possible to use

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Conclusion

- We believe that the most viable option is to reference the FDDI standard, but include changes of the physical parameter specifications (i.e option B)
- The target of the physical parameter changes should be both to include most existing SM “100Mb” TRx products but also to facilitate low-cost optimization of future designs.