

---

# The need for a robust 10GBASE-LRM Standard

May 9, 2005

Steve Swanson (swansonse@corning.com)

# Setting the record straight

---

- I support all multimode fiber PMDs
- I daresay that most fiber manufacturers will also support multimode fiber PMDs
  - During the development of the 10GBASE-R Standard, the fiber manufacturers led the effort promoting 5 PMDs
- Interestingly, the same folks who argued for fewer (3) PMDs are now the folks calling for additional PMDs
- Regardless, there are three requirements that must be met to gain my support for the LRM Standard
  - A Standard that supports robust operation over all multimode fiber
  - A Standard that applies the same set of rules for all optical PMDs
  - Proven technical feasibility based on real parts

## At the 15,000 meter level

---

- The fiber manufacturers **want** to support the installed base
  - To the extent possible with a 20+ year old design
- The technical details don't really matter until we can agree on what we are trying to accomplish
- The PAR **does not** give us license to reduce the robustness for LRM
  - Even though the PAR states “lower cost”, it also states 220m and does not state lower cost at the expense of lower reliability or robustness

## What we know

---

- LRM is not the only option for supporting multimode fiber
  - LX-4 supports 300m on legacy multimode fiber
  - SR supports 300m on new multimode fibers
  - Both LX-4 and SR had the same burden of proof and robustness criteria
- Supporting 300m on LRM should mean the same thing as supporting 300m on LX-4 and SR
  - We want to enable an educated choice between the options

**If LRM means something else, how does one choose between LX-4, SR and LRM?**

## What we know (cont.)

---

- The official objectives
  - Support at least 220m on installed 500 MHz•km multimode fiber
  - Support at least 300m on multimode fiber
- The stated objectives
  - Support at least 300m on installed 500 MHz•km multimode fiber
  - Support low cost

**The current draft will not meet the stated objectives**



## What we don't know (or can't agree on)

- Acceptable failure rate, complexity and supportable distances
- Make-up of the installed base of fiber
- How to test
- Real impact of dual launch
- There are others but....

**We need to frame up the problem before we can solve it**

# EDC – incompatible goals

The three goals defining the triangle are not independent: two parameters determine the 3<sup>rd</sup>.

Low cost, low complexity

- PIE-D=4.5

At March meeting, we agreed that we cannot meet all three

W/C design

- 99% coverage of installed base

Objectives

- Length=300m

## EDC – what people want

---

- I want to require LRM to meet the same requirements that LX-4 and SR were required to meet
  - consistent standards for LRM, LX-4 and SR that deliver plug-and-play solutions
- Others want reduced complexity (lowest cost) at the stated distance at the expense of coverage
  - relaxed specs and higher risk

**If LRM is allowed to be specified with lower robustness, then we are misleading our customers who have come to expect plug-and-play solutions from IEEE**



# What I think we need for support of LRM

---

- An LRM Standard that provides a robust solution for
  - 300m operation at 99% link coverage with a single launch for plug-and-play operation

OR

- A less capable LRM Standard that is deemed economically viable
  - At the corresponding distance supporting 99% link coverage with a single launch for plug-and-play operation

**I am open to other suggestions but I cannot support an LRM Standard that applies different rules for similar optical PMDs**