

Installed Base Coverage Deficiencies and Remedies for 10GBASE-LRM

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Deficiency #1

Fiber coverage is being used for calculating specifications

Concerns

- NOT the same as duplex **link** coverage used for 802.3 precedents.
- 10 GBE is a duplex link: if one of two fibers fails, **THE LINK FAILS.**
- **Customers care about link coverage.**
- **95% fiber coverage** provides $0.95^2 = \text{only } 90\% \text{ link coverage.}$
- 99.5% fiber coverage provides $0.995^2 = 99\% \text{ link coverage.}$

Motion 1

Use Link Coverage for 10GBASE-LRM

For all 802.3aq calculations and analysis of installed MMF, the percentage of duplex links capable of supporting compliant 10GBASE-LRM PMDs shall be used as the basis for any normative 10GBASE-LRM parameters which are relaxed to less than 100% coverage at the maximum rated reach, for each optical fiber type specified. Such duplex link coverage shall be calculated as follows:

$(\text{fiber coverage})^2 = \text{duplex link coverage}.$

Deficiency #2: 802.3aq is not following precedents

Instead we are heading toward a 90% “plug and pray” PMD

IEEE 802.3 Optical PMD Precedents

- **Worst Case design philosophy as described in “Gigabit Ethernet Networking” p 302 and 303**
 - “Ethernet is a very successful technology. One of the reasons is the use of a *worst case design philosophy*, which states the following: When all specified link parameters are at their worst case values, the link should operate normally.
 - “If the Ethernet committee is to allow a statistical specification of a parameter in a multi-vendor environment, then it expects full statistics of the behavior of that parameter to be disclosed. The committee also expects only to be asked to relax the parameter a little, to something like the 99th percentile value.
 - The Ethernet committee did not allow any Gigabit optical parameters to be statistically specified.
- **SR and LX4 specified to worst case design philosophy**

Deficiency #2: 802.3aq is not following precedents

Instead we are heading toward a 90% “plug and pray” PMD

- **Having LX4 does not justify a lower coverage requirement for LRM.**
 - **Per our PAR, LX4 is not viable as a back-up for non-functional LRM links**
 - **LRM will be in XFP, and LX-4 is not expected to be in XFP.**

We must use 99% Worst Case Design Philosophy for LRM *Optical PMDs support backbones*

- **Past Optical Ethernet PMDs specified to 99% or 100% worst case philosophy**
- **Backbones support many users per link and must be reliable.**
- **Customers expect high reliability from Optical Ethernet PMDs**

Motion 2

Use 99% worst case design philosophy for 10GBASE-LRM

Normative maximum operating distances, associated specifications, compliance test procedures and parameters for 10GBASE-LRM shall all support at least 99% duplex link coverage of the installed base for all supported fiber types.