

SYSTIMAX®
SOLUTIONS

10GBASE-LRM Specification Philosophy

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IEEE 802.3 Worst-Case Design Philosophy

- **With all parameters at worst-case, link BER < limit**
 - Major reason for Ethernet's success
 - *Plug and Play, not Plug and Pray*
 - Supports multi-vendor interoperability
- **Exceptions relax parameter to $\geq 99^{\text{th}}$ percentile**
 - 1BASE5
 - 10BASE-T
 - 100BASE-T4
 - 10GBASE-S

} Crosstalk

Inter-Symbol Interference

Exceptions to Worst-Case

| PMD | Clause | Year | Parameter | Method | Threshold |
|------------|---------------|-------------|------------------|---------------|------------------|
| 1BASE5 | 12 | 1987 | Crosstalk | Monte Carlo | ≥ 99% |
| 10BASE-T | 14 | 1990 | Crosstalk | Monte Carlo | ≥ 99% |
| 100BASE-T4 | 23 | 1995 | Crosstalk | Monte Carlo | ≥ 99% |
| 10GBASE-S | 52 | 2002 | OM3 ISI | Monte Carlo | ≥ 99.5% |

LRM Considerations

- **Link margins thin and risks increase**
 - **As bit rates increase**
 - 100MbE: 6 dB margin (could apply to add'l loss)
 - 10GbE: 0.6 dB margin (reserved, off-limits)
 - **As complexities increase**
 - Multi-channel optics (each channel multiplies FIT rate)
 - EDC of MMF (LRM first application of complex system)
 - **With mixed-vendor environment**
 - Different specs challenge different vendors
 - Worst-case approach covers all bases

LRM Specification Wisdom

Robust solutions key to Ethernet success

- **Apply time-proven philosophy**
 - Validated by: 17 years experience
300,000,000 Ethernet ports
- **Relax to no less than 99th percentile**
 - Employ Monte Carlo method