10g optical module dispersion

Article Overview

Chromatic dispersion in 10G optical modules limits link distance and increases bit error rates, especially for long-reach 1550 nm SFP+ links.

Understanding Dispersion in 10G Modules

At 10 Gbps, chromatic dispersion becomes a critical factor in optical fiber links. Dispersion occurs because different wavelengths of light travel at slightly different speeds through the fiber, causing pulse broadening. This can lead to inter-symbol interference (ISI), where pulses overlap and the receiver cannot distinguish between logical 0s and 1s, even if optical power is sufficient .

• 10GBASE-LR (1310 nm, up to 10 km): Chromatic dispersion is relatively low at 1310 nm, making LR modules suitable for metro and enterprise backbones without requiring electronic dispersion compensation (EDC), .

• 10GBASE-ZR (1550 nm, up to 80 km): At 1550 nm, standard single-mode fiber (G.652) has a dispersion coefficient of ~17–18 ps/(nm·km). Over 80 km, this results in ~1440 ps/nm of pulse broadening, leaving only a small margin for patch cords and connectors. Dispersion, not attenuation, is the primary limiting factor for long-reach 10G links .

Dispersion Penalty

The dispersion penalty quantifies the additional optical power required to maintain a target Bit Error Rate (BER) in the presence of dispersion. For 10G SFP+ ZR modules, the maximum dispersion tolerance is typically 1600 ps/nm. Exceeding this limit can cause link failures even if the received optical power is within specification .

Mitigation Techniques

Article Content

Arista Optics Modules and Cables

Overview Arista''s Optical Modules and Cable portfolio offer a wide variety of high-density and low-power 800G (dual 400G), 400G,

Optical Fiber and 10 Gigabit Ethernet

Introduction As 10 Gigabit Ethernet (10GbE) is introduced into networks the physical limitations and properties of optical fiber

Cisco 10GBASE SFP+ Modules Data Sheet

Product overview The Cisco® 10GBASE SFP+ modules (Figure 1) give you a wide variety of 10 Gigabit Ethernet connectivity options

What Is 10GBASE-LR? SMF 1310nm 10km SFP+ Explained

Dispersion Tolerance: 10G-LR modules tolerate chromatic dispersion up to 1.0 ns/nm, covering standard SMF deployments over the

Cisco Transceiver Modules

Use Dense Wavelength-Division Multiplexing (DWDM) SFP+ modules to integrate WDM transport directly into your Cisco 10 Gigabit

Technical Characteristics Of 10G Optical Modules With 1310nm And

Dispersion, also known as pulse broadening, is a physical characteristic of optical signal transmission in optical fibers.

Three approaches to solving dispersion compensation at 10G

TeraXion offers a discrete dispersion compensation module (DCM) that provides an attractive alternative to the incumbent DCF

The 10G Ethernet Link Model

What it does 1/2 Deterministic Fibre attenuation and dispersion calculated according to standard formulae All risetime, bandwidth,

10GBASE-LRM SFP Module Guide: Specs, Distance & Use Cases

Learn what a 10GBASE-LRM SFP module is, how it works on multimode fiber, key specifications, distance limits, and common

10GBASE-LRM SFP Module Guide: Specs, Distance & Use Cases

In this guide, you will learn what a 10GBASE-LRM SFP module is, how it works, its key technical specifications, and when it makes

Selecting TI SigCon Devices for SFF-8431 SFP+ Applications

TI''s 10G products cover three levels of signal conditioning performance and multiple channel count options. Thus, switch or router

All About the SFP-10G-ZR: Understanding the 1550nm 80km Optical ...

The SFP-10G-ZR optical module offers 10G data rate, 1550nm wavelength, and 80km reach, perfect for long-haul telecom and

10G SFP+ Optical Transceivers | Transceiver Module

FS 10GbE SFP+ module solutions provide a wide variety of 10 Gigabit Ethernet connectivity options for data centers, enterprise

Optic Modules Datasheet

Features and Benefits The following table lists the different pluggable optic modules and supported platforms, along with the

Contact Us

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