

WHITE PAPER

Ultra-Low-Loss Dispersion Emulator: 50 000 ps/nm - The Size of a Shoe Box

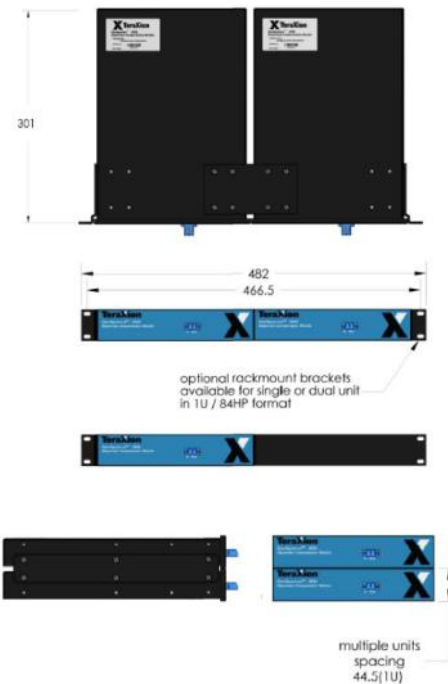
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Introduction

This paper aims to explain the value proposition of TeraXion's dispersion emulator, the ClearSpectrum™-CDE, in coherent detection systems. We will review its key technical features and pinpoint the main advantages of using such an FBG-based chromatic dispersion emulator instead of fiber spools.



TeraXion's ClearSpectrum™-CDE



ClearSpectrum™-CDE mounting options

Chromatic dispersion emulation using an FBG-based emulator

The ClearSpectrum™-CDE is a static chromatic dispersion emulator designed to emulate ten thousand picoseconds per nanometer in a compact half-U unit while maintaining a very low insertion loss. Entirely passive, it can be cascaded several times to achieve dispersion levels as those as transpacific links (200 000 ps/nm) with a granularity of 3 333 ps/nm. Commonly used to emulate long haul dispersion level of 50 000 ps/nm (~3 000 km), these modules have a very low latency, a high input power handling and minimal non-linear behavior.

Compensation level	+3 333 ps/nm	+6 666 ps/nm	+10 000 ps/nm
Channel spacing	200 GHz ¹	200 GHz ¹	200 GHz ¹
Operation BW	>50 GHz	>50 GHz	>50 GHz
Insertion loss	<4 dB	<8 dB	<12 dB
Latency	<50 ns	<100 ns	<150 ns

(1): 100 GHz option available

Table 1: ClearSpectrum™-CDE main specifications

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What makes CDE the solution of choice for coherent communication systems?

Coherent detection has become the most promising technology for next-generation high-speed transmission systems. In fact, while many coherent detection systems are under development, some are already available. Manufacturers of coherent receivers and line cards are now using advanced digital signal processor (DSP) algorithms to compensate fiber impairments such as significant amount of chromatic dispersion (CD). One of the key challenges that they are facing regarding CD is to generate significant amount of dispersion in order to test their CD system tolerances in a typical setup such as the one presented in Figure 1. Whether at the development stage or in volume production, it is obvious that dealing with thousands of kilometers of fiber is not an easy task: the obvious problems are how you stock all of those bulky SMF spools and how you will manage the tremendous loss of hundreds of dB.

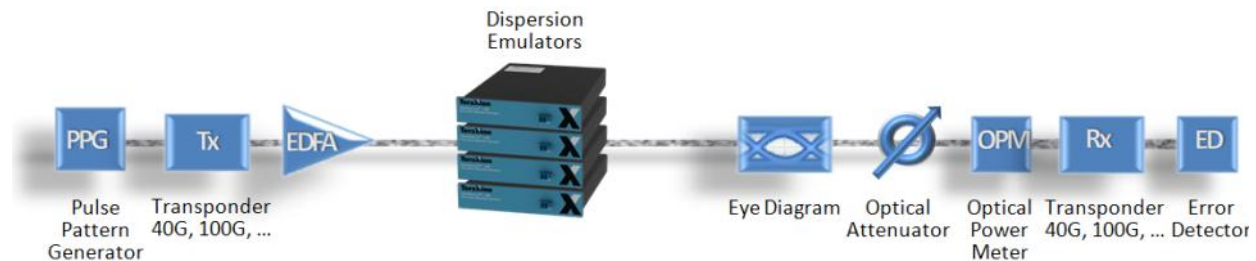


Figure 1: Typical setup to achieve dispersion tolerance measurement of coherent detection transponder/line card.

A good way to avoid these problems is to use TeraXion's ClearSpectrum™-CDE instead of fiber spools. The two main advantages are:

1. Ultra-low-loss

With losses below 12 dB for a module of ten thousand picoseconds per nanometer, losses for chromatic dispersion generation can drastically be reduced by a factor of 10, thus significantly reducing the number of amplifiers required.

2. Compact half-U module

Being able to emulate 40 000 ps/nm of dispersion using only two slots of a 1U rackmount reduces by at least a factor of 5 the required space of the dispersion emulators compared to cumbersome fiber spools. Less of the precious work space can then be dedicated to dispersion emulation and the system test becomes easier to move.

Please visit TeraXion's web site at www.teraxion.com for more information, or contact Benoit Maheux at bmaheux@teraxion.com

About TeraXion

TeraXion is a leading-edge photonic solutions provider for high-end applications of the optical communications, industrial lasers and optical sensing markets. Its line of OEM chromatic dispersion management solutions includes Telcordia-qualified low-loss static and tunable dispersion compensators for terrestrial and submarine networks. TeraXion offers customized filtering solutions based on advanced FBG technology and narrow linewidth semiconductor laser sources for RF photonic and coherent detection systems.

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