SIMULATION OF WDM USING OPTSIM SOFTWARE

INTRODUCTION

RSoft OptSim is an award-winning software tool for the design and simulation of optical communication systems at the signal propagation level. With state-of-the-art simulation techniques, an easy-to-use graphical user interface and lab-like measurement instruments, OptSim provides unmatched accuracy and usability. The software has been commercially available since 1998 and is in use by leading engineers in both academic and industrial organizations worldwide.

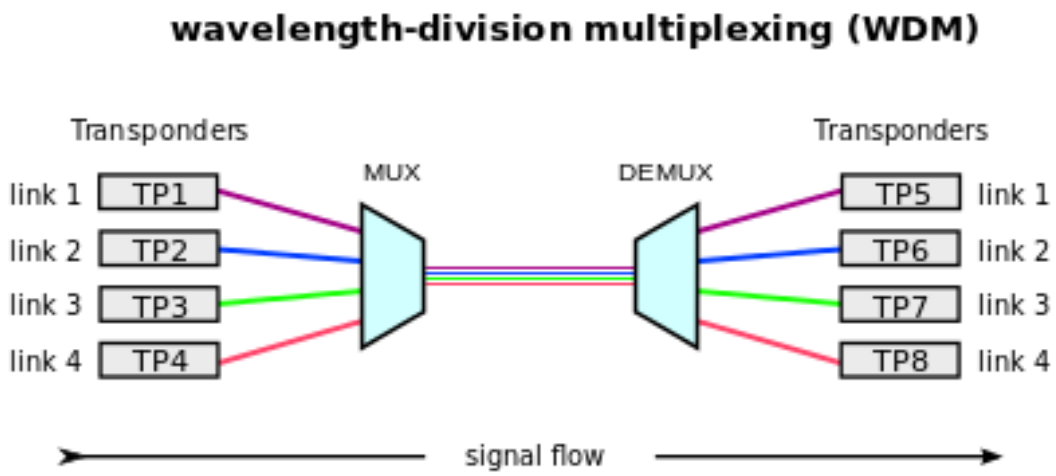
Benefits of OPTSIM

- Virtual prototyping of optical communication systems for increased productivity and reduced time to market.
- Design optimization for enhanced performance and reduced costs.
- Interfaces with third-party tools such as MATLAB and the Luna Optical Vector Analyzer.
- Advanced electrical modeling with embedded SPICE engine.

Wavelength Division Multiplexing (WDM)

In fiber optic communications, **wavelength-division multiplexing** (**WDM**) is a technology which multiplexes a number of optical carrier signals onto a single optical fiber by using different wavelengths (i.e. colors) of laser light. This technique enables bidirectional communications over one strand of fiber, as well as multiplication of capacity.

The term *wavelength-division multiplexing* is commonly applied to an optical carrier, which is typically described by its wavelength, whereas frequency-division multiplexing typically applies to a radio carrier which is more often described by frequency. This is purely conventional because wavelength and frequency communicate the same information.



Wavelength division multiplexing (WDM) is a technique modulating various data streams, i.e. optical carrier signals of varying wavelengths in terms of colours of laser light onto a single optical fiber. Wavelength division multiplexing WDM is similar to frequency-division multiplexing (FDM) but referencing the wavelength of light to the frequency of light. WDM is done in the IR portion of the electromagnetic spectrum instead of taking place at radio frequencies (RF). Each IR channel carries several RF signals combined with frequency-division multiplexing (FDM) or time-division multiplexing (TDM). Each multiplexed infrared channel is separated or demultiplexed into the original signals at final point. Data in different formats and at different speeds can be transmitted simultaneously on a single fiber by using FDM or TDM in each IR channel in combination with WDM. It allows network capacity to be gradually and cost effectively increased.

A) MUX:

In electronics, a multiplexer is a device that selects one of several analog or digital input signals and forwards the selected input into a single line. A multiplexer of inputs has select lines, which are used to select which input line to send to the output. Multiplexers can also be used to implement Boolean functions of multiple variables.

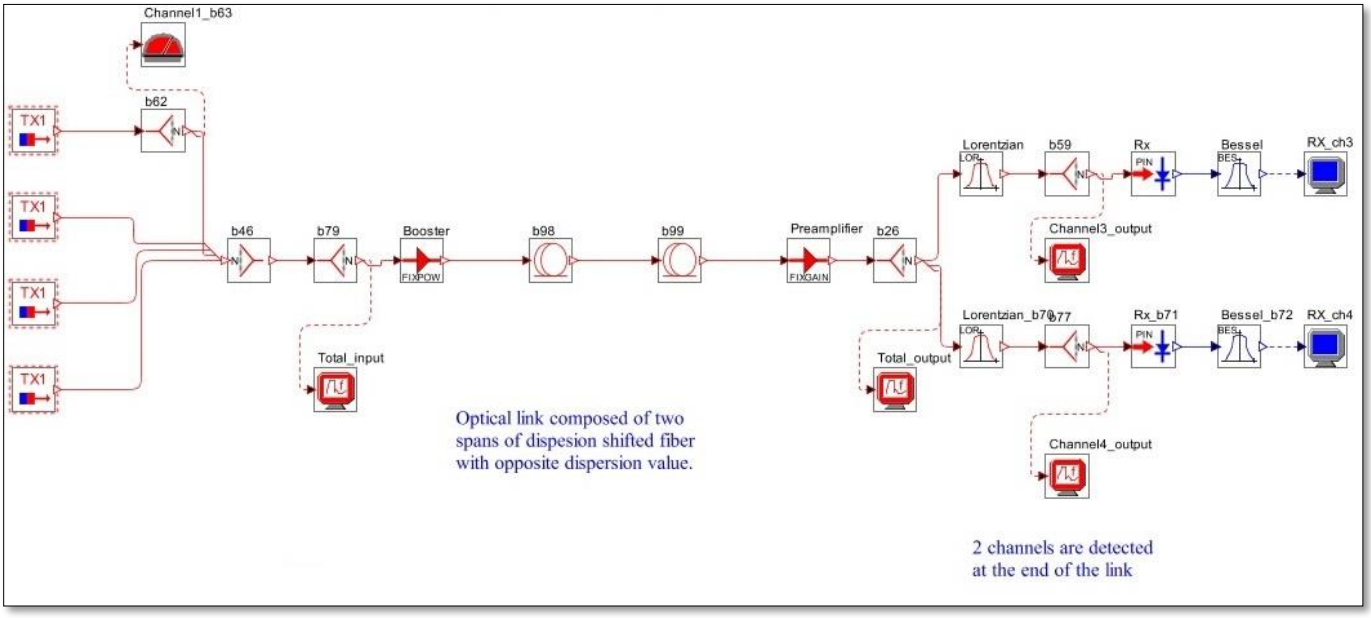
B) DEMUX:

A demultiplexer is a device that takes a single input line and routes it to one of several digital output lines. A demultiplexer of 2^n outputs has n select lines, which are used to select which output line to send the input. A demultiplexer is also called a data distributor.

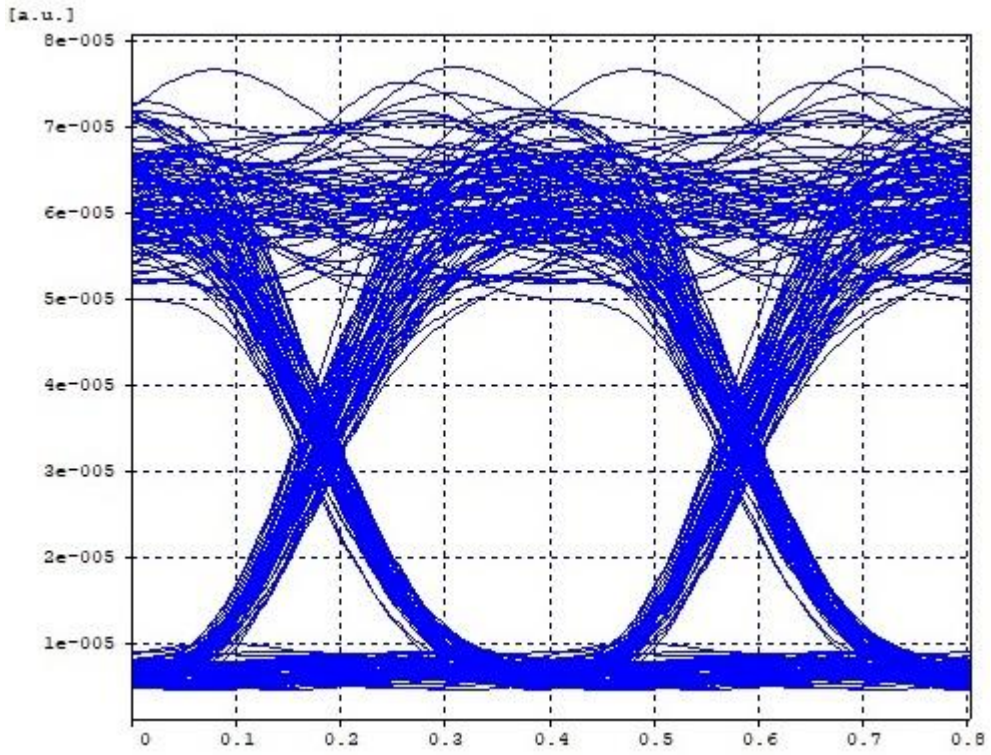
C) TRANSPONDER:

In telecommunication, a transponder can be one of two types of devices. In air navigation or radio frequency identification, a flight transponder is an automated transceiver in an aircraft that emits a coded identifying signal in response to an interrogating received signal. In a communications satellite, a satellite transponder receives signals over a range of uplink frequencies, usually from a satellite ground station.

SIMULATION OF 4-CHANNEL WDM SYSTEM



EYE DIAGRAM OF 4-CHANNEL WDM SYSTEM



ADVANTAGE OF WDM

1.It increases the information carrying capacity of a fiber.

2.It has greater transmission capacity.

3.Duplex transmission.

4.Simultaneous transmission of various signals.

5.Easy system expansion.

6.Lower cost.

FEATURES:

- Support for multiple parameter-scans-based optimization.
- Only design tool with multiple engines implementing both the Time Domain Split Step and the Frequency Domain Split Step for the most accurate and efficient simulation of any optical link architecture.
- MATLAB interface makes it easy to develop custom user models using the m-file language and/or the Simulink modeling environment.
- Interfaces with laboratory test equipment such as Agilent and Luna to merge simulation with experiment.
- Interfaces with device-level design tools such as BeamPROP and LaserMOD provide a powerful mixed-level design flow for optoelectronic circuits and systems.

CONCLUSION:

WDM works by combining and splitting signals in different systems ranging from telecommunications to imagine systems. There are many WDM products including CWDM, MUX, DEMUX, DWDM, optical add drop multiplexer, WDM filter and so on.

REFERENCES:

1. ITU-T G.694.2, "WDM applications: CWDM wavelength grid"
2. ITU-T G.652, "Transmission media and optical systems characteristics – Optical fibre cables"
3. ITU-T G.694.1, "Spectral grids for WDM applications: DWDM frequency grid"
4. DWDM ITU Table, 100Ghz spacing" telecomengineering.com
5. Markoff, John. “Fiber-Optic Technology Draws Record Stock Value.” The New York Times. March 3 1997.
6. Hecht, Jeff. “Boom, Bubble, Bust: The Fiber Optic Mania.” Optics and Photonics News. The Optical Society. Pg. 47. October 2016.
7. “New Technology Allows 1,600% Capacity Boost on Sprint's Fiber-Optic Network; Ciena Corp. System Installed; Greatly Increases Bandwidth" Sprint. June 12 1996.