





DWDM

Applications

- Long-haul optical networks either in point-to-point or ring topology.
- Expanding the capacity of an existing optical network.
- Capacity leasing for network wholesalers.

Dense Wavelength Division Multiplexing (DWDM) is a technology that allows multiple information streams to be transmitted simultaneously over a single fiber. This provides a cost effective method to increase the capacity of the existing networks without the need to add additional fiber. This application note explains capabilities of the OptiSystem software to explore different design structures (e.g. modulation format, linear and nonlinear impairment compensation) to optimize the performance of these networks for access and long-haul application.



Overview

DWDM Layout

Benefits

- New BER Test Set enables the simulation of millions of bits for direct error counting.
- Multi-parameter scanning enables system designers to study trade-offs with respect to parameters of interest and to choose an optimal design for deployments.
- FEC
- Enables users to analyze different algorithms for the electronic equalization.

design tools.

Interfaces with popular

- MATLAB^{*} SIMULINK OptiSPICE Agilent Scillab
- Significantly reduces product development costs and boosts productivity through a comprehensive design environment to help plan, test, and simulate optical links in the transmission layer of modern optical networks.

Simulation Description

In the above layout, we have simulated a 32-channel DWDM network with both RZ and NRZ modulation formats at 40 Gbps. The transmitter section consists of a 32-channel WDM transmitter and multiplexer; the frequency spacing is 100 GHz. We have used a transmission loop as an optical link with a length of 50 km of SMF, 10 km of DCF and two EDFAs. The receiver is a 32-channel WDM demultiplexer, with PIN photodetectors and BER testers.

Below are the images of the signal spectrum obtained for RZ an NRZ modulation formats. It is also possible to use other formats such as carrier-suppressed return-to-zero (CSRZ), duobinary return-to-zero (DRZ) and modified duobinary return-to-zero (MDRZ).



Using OptiSystem you can easily modify different parameters of the simulation, such as number of optical fiber spans, which will allow you to test the system's robustness over propagation length.

The next two eye diagrams show the received signal for a single channel for both RZ an NRZ modulation formats after 180 km of propagation.



Furthermore, using the WDM analyzer we can view critical information about each channel such as signal power, noise power and OSNR.

Frequency (THz)	Signal Power (dBm)	Noise Power (dBm)	OSNR (dB)	Signal Index: 0 -
193.41449	-4.7109025	-25.757983	21.04708	- From Jonou
193.51449	-4.6746038	-26.617771	21.943168	riequency
93.61449	-4.6015497	-24.753712	20.152162	Units: THz 💌
193.71449	-4.6024425	-25.553359	20.950916	
193.81449	-4.5787167	-26.22031	21.641593	Power
193.91449	-4.6031376	-25.034491	20.431354	Units: dBm Resolution Bandwidth Res: 0.1 nr
194.01449	-4.4630057	-26.410718	21.947712	
194.11449	-4.6944329	-25.211965	20.517532	
194.21449	-4.867458	-25.500569	20.633111	
194.31449	-4.4629147	-24.899633	20.436719	
194.41449	-4.4348429	-25.181613	20.74677	
194.51449	-4.5041663	-24.766742	20.262576	
194.61449	-4.4995085	-25.167222	20.667713	
194.71449	-4.4506953	-25.243031	20.792335	
194.81449	-4.4657279	-25.474877	21.009149	
194.91449	-4.5409172	-25.159022	20.618105	
195.01449	-4.6763676	-25.236371	20.560004	
195.11449	-4.5989752	-24.575453	19.976478	
195.21449	-4.8849844	-25.351903	20.466919	
195.31449	-4.9644194	-25.763679	20.79926	
195.41449	-4.4138571	-24.78352	20.369663	
195.51449	-4.7375551	-26.256819	21.519264	
195.61449	-4.5095605	-25.018784	20.509224	
195.71449	-4.5883347	-25.262101	20.673766	
195.81449	-4.7382405	-25.097193	20.358953	
195.91449	-4.5194313	-25.182948	20.663517	
196.01449	-4.6502598	-26.231452	21.581192	
196.11449	-4.6975788	-26.012807	21.315229	
196.21449	-4.3290564	-25.506498	21.177442	
196.31449	-5.0417976	-25.144421	20.102623	
196.41449	-4.3635998	-26.024874	21.661274	
196.51449	-4.7490591	-26.013507	21,264448	

