Optiwave

OptiSystem
Optical Communication System
and Amplifier Design Suite

Fiber To The Home

Applications

- High speed internet
- Broadband multimedia access
- Tele-medicine
- Distant learning

Overview

A broadband access network offers various high-speed services to the end-user such as internet, multimedia, tele-medicine and distant learning. Fiber to the home (FTTH) is an optical access network architecture that uses optical fibers to replace all or part of the metallic cables to the end-user. Using OptiSystem we can explore the performance of different architectures for FTTH networks. In this application note, we explain an optical code-division multiple access (OCDMA) structure using three users.

FTTH: OCDMA Network Layout
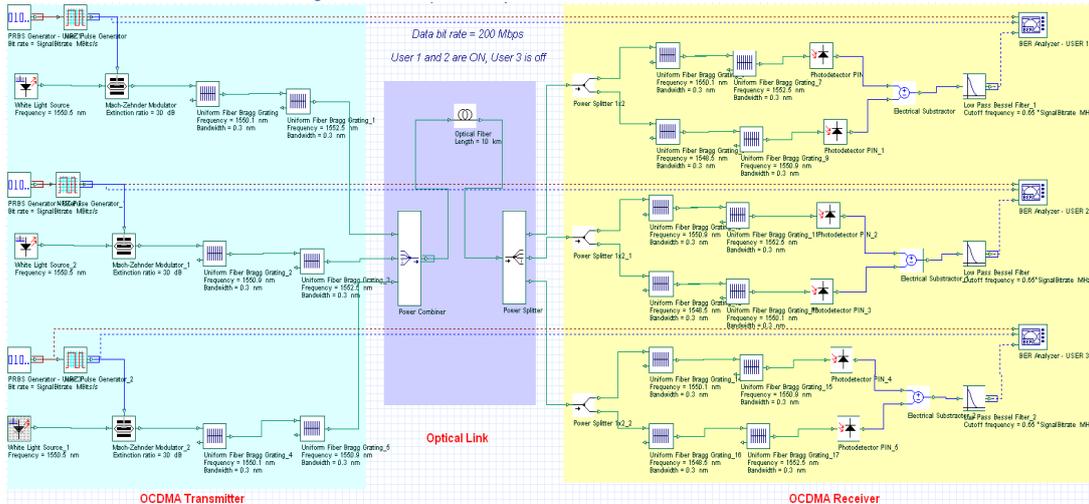
Benefits

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

- FEC
- Interfaces with popular design tools.
- 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.

MATLAB   SIMULINK

OptiSPICE   Agilent

Scilab
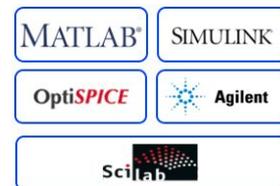
Simulation Description

In the above layout, we have simulated a 3-user fiber bragg grating (FBG) based OCDMA network at 200 Mbit/s. Uniform FBGs are used to impelement the Modified Quadratic Congruence (MQC) codes by spectral amplitude encoding. The signal is generated using an incoherent source modulated with NRZ PRBS data using a Mach-Zehnder Modulator. The optical link is 10 km of single mode fiber. The receiver is comprised of two spectral filters and two photodetectors connected in a balanced configuration which perform the decoding with a low-pass filter and a BER analyzer. In this experiment User 1 and 2 are ON and User 3 is OFF.

The next two figures demonstrate the spectra of the encoded data for User 1 and 2.
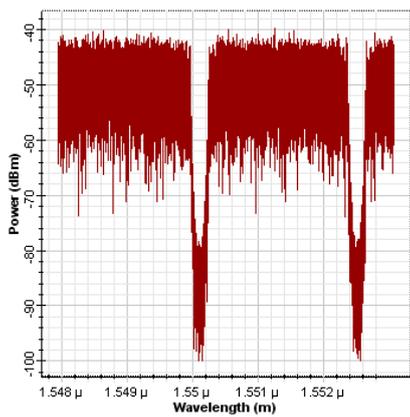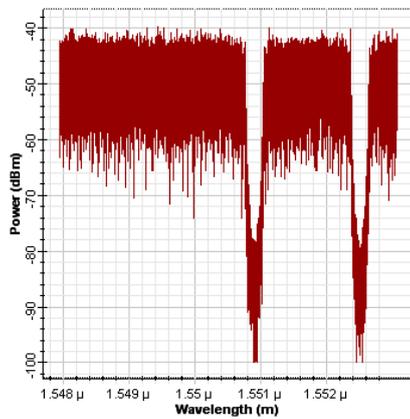
Next we illustrate the signal in time domain for User 1 and eye diagrams for User 1 and 2. Using Opti*System* you can analyze the performance of optical access networks by varying coding schemes, modulation format, number of users, and propagation length.