

# OptSim Elite

## Electro-Optic Cosimulation of Photonic Integrated Circuits and Systems

**Traditional electrical designers can now easily simulate and analyze photonics in the same, familiar flow**

### Overview

OptSim Elite is Synopsys' new simulation solution which, provides complete photonic system and circuit simulation capabilities, provides electro-optic (E/O) co-simulation with Synopsys' electrical circuit simulators, and integrates seamlessly with the simulation and analysis environment (SAE) of OptoCompiler.

### Introduction

Photonic integration is an answer to the ever-increasing bandwidth demands, energy efficiency, smaller footprint, and reliability. The adaptation of PICs is rapidly growing across the industry segments such as data centers, optical interconnects, automotive, sensing, aerospace & defense, artificial intelligence (AI) and photonic computing. The PICs are becoming complex and component count is increasing at a rapid pace. Co-packaged optics (CPO) is driving more complex trade-offs between electronics and photonics and gone are the primitive days when it was enough to model photonics as electronics in electrical circuit simulators. With OptSim Elite, you use industry's best electrical circuit simulators in conjunction with the most comprehensive photonic circuit simulator on the respective portions of the design within the familiar OptoCompiler platform.

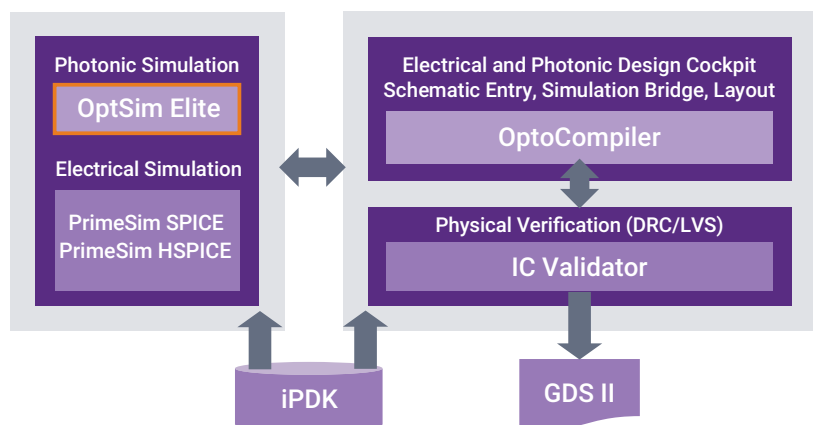


Figure 1: Photonic and electronic circuit and system simulation from the OptoCompiler cockpit

## Features

In addition to the complete PIC model library, OptSim Elite provides a rich library of single- and multi-mode fiber-optic system design models which allow designers to test a PIC at the system level.

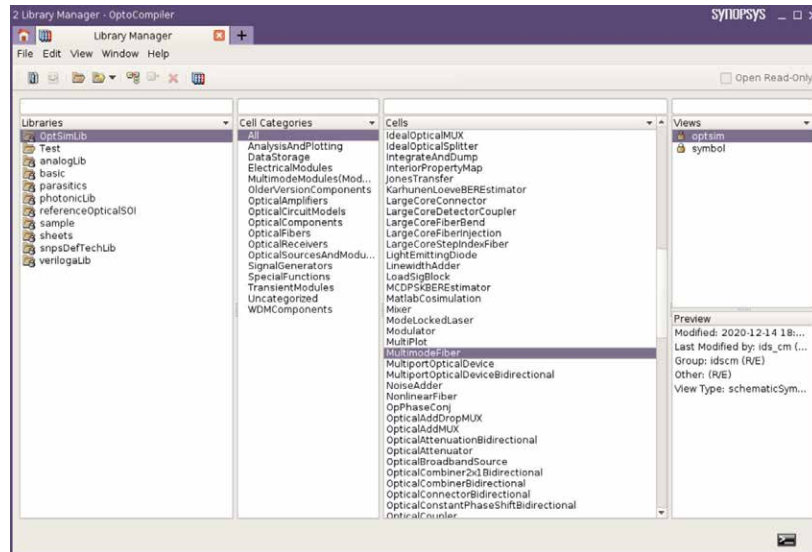


Figure 2: OptSim Elite library includes circuit and system design models

- Models bidirectional signal flow for both optical (single- and multi-wavelength) and electrical signals
- Models multipath interference (MPI), reflections and resonances from network and PIC elements
- Supports simulation of design hierarchies
- Supports measurement- and datafile-driven modeling of active and passive, photonic, and electronic components, and circuits
- OptSim Elite supports PDK-driven design as well as custom libraries, also in combination
- Co-simulation with PrimeSim Continuum, which includes PrimeSim HSPICE and PrimeSim SPICE, and enables simulation of electronics in the PIC using industry leading electrical circuit simulators together with the simulation of photonic circuits in OptSim Elite

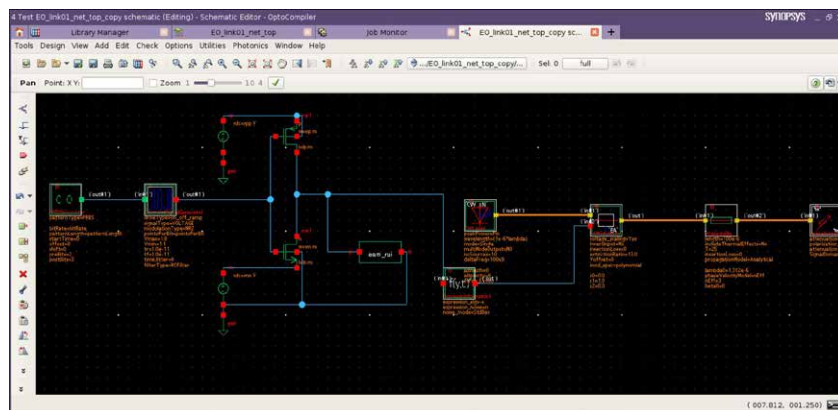


Figure 3: Co-simulating electronic and photonic circuits in OptSim Elite

- OptSim Elite is integrated with Synopsys Simulation and Analysis Environment (SAE) for both electrical and photonic netlists allowing setting up of testbenches, specifying simulation engine and parameters, performing scans and analyses

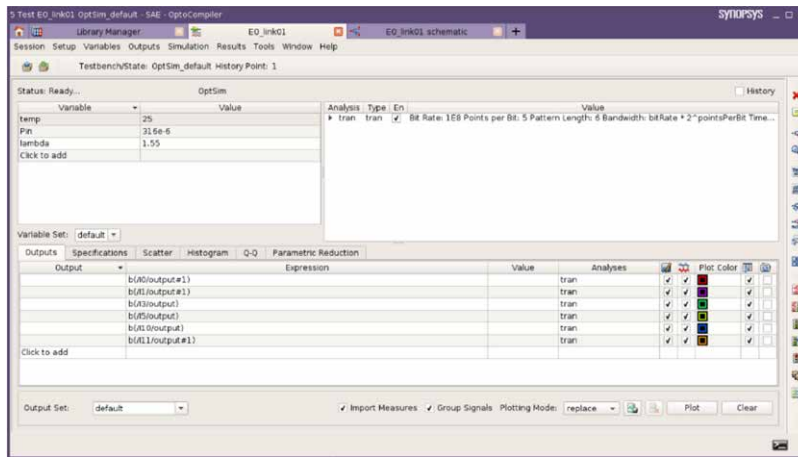


Figure 4: Setting up a testbench and simulation setup in SAE

- OptSim Elite results and waveforms (logical, electrical, and optical) can be viewed via SAE in both the Custom Waveview and OptSim Viewer

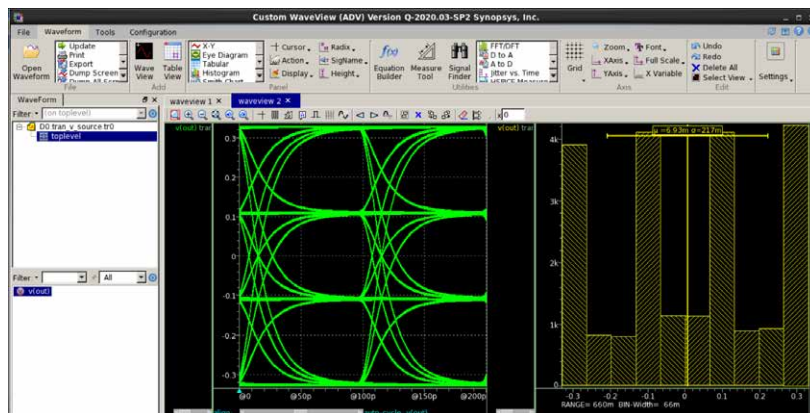


Figure 5: OptSim Elite: Viewing simulation waveforms in PrimeWave

## Applications

- Single- and multi-stage Photonic Integrated Circuits (PICs)
- Transceivers for coherent and non-coherent fiber optic communication systems
- Single- and multimode fiber-optic systems
- Segmented-electrode (SE) and traveling-wave Mach-Zehnder modulators (TW-MZM), optical filters, ring resonators, ring modulators
- Photonic systems with multipath interference (MPI), reflections and resonances
- All-optical data center switching
- Photonic sensor PICs
- PICs for photonic computing, optical neural networks, and life sciences

## Platform Support

- Red Hat Enterprise Linux 6.6+ (64-bit)
- CentOS 6.6+ (64-bit)