

# **OptiSystem** What's New in

# 9.0

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Created to address the needs of research scientists, optical telecom engineers, professors and students, OptiSystem satisfies the demand of users who are searching for a powerful yet easy to use optical communication system design tool.



## What's new in OptiSystem 9.0

The most comprehensive optical communication design suite for optical system design engineers is now even better with the release of OptiSystem version 9.0, available in 32-bit and TRUE 64-bit editions.

The latest version of OptiSystem features a number of new enhancements to address the design of passive optical network (PON) and 100 Gigabit Ethernet architectures using orthogonal frequency division multiplexed (OFDM) signals and optical coherent detection.

The OptiSystem amplifier library is now extended to include Thulium-doped fibers, as Tm-doped fiber is used for applications at amplification bandwidths not covered by the EDFAs and YDFAs, like 1460-1530 nm and 1650-2050 nm.

## New Component Libraries

### *Transmitters*

- **DP-QPSK and QPSK Transmitters:** New transmitters encapsulate the complexity of advanced modulation formats such as DP-QPSK and QPSK, facilitating the design of fiber-optic communication networks. New parameter allows for the selection between internal or external PRBS source for Optical, Spatial, Duobinary, CSRZ and DPSK Transmitters.
- **OFDM Modulator/Demodulator Measured:** OFDM can be applied in optical long haul transmission systems and has many advantages over conventional single-carrier modulation formats.

The new components allow for the simulation of OFDM transmitters and receivers, supporting user defined subcarrier indexes and different types of modulation schemes such as BPSK, QPSK, QAM, etc. Additional DAC stage includes different types of interpolation and smoothing filter options. New graph display OFDM FFT of subcarrier indexes.

- **Digital Modulators/Demodulators and Line Coders/Decoders:** New components allows for PPM and DPIM modulation. 4B5B, NRZI, AMI, Manchester, 4B3T and 8B10B data encoders are also available.
- **Burst Modulator/Demodulator:** New modulator allows for selecting bits in a frame allowing for analysis of burst error rates.

### ***Signal Processing***

- **Electrical Downsampler:** New parameter permits selection between time or frequency domain downsampling.
- **Serial To Parallel Converter 1xN/ Parallel To Serial Converter Nx1:** New components with arbitrary number of inputs/outputs allow for the simulation and processing of individual bits instead of blocks.
- **Optical Signal Detectors:** Power, Phase and Chirp detectors allows for signal processing of optical signals.

### ***Receivers***

- **Optical Coherent QPSK and DP-QPSK Receiver:** Encapsulates the complexity of coherent detection of QPSK (single and dual-polarization) modulation formats, facilitating the design of fiber-optic communication networks based on coherent detection. New option for APD included with Optical DPSK Receiver.

### ***Passives***

- **Transmission Line Components:** New Coaxial Cable, Transmission Line, Two Wire Cable, RLCG Transmission Line and Parallel Plate Transmission Line components.
- **Saturable Absorber:** Saturable absorber mirror for designing passive mode locking of fiber lasers.

### ***MATLAB***

- **MATLAB Component:** Complete redesign of MATLAB component interface allows for user defined parameter names and types, choice of signal types for input and output ports, component resizing, and user defined icon.

### ***Scilab***

- **Scilab Component:** Co-simulation in time, frequency and spatial domain with Scilab. New flexible user defined component allows the user to specify the number of inputs, outputs and parameters.

### ***Free Space Optics***

- **FSO Channel:** A new large-scale and small-scale scintillation statistical model is incorporated to the component. Predicts detection and fading probabilities associated with a given channel.

### *Optical Amplifiers*

- **Thulium Doped Fiber:** New rare-earth doped fiber added to the amplifiers library to cover the amplification bandwidths of 1460-1530 nm and 1650-2050 nm.
- **Optical Fiber Amplifier:** New fiber amplifier component which includes signal propagation and amplification that facilitates the simulation of mode-locked fiber lasers.
- **Erbium and Ytterbium Doped Multimode Fibers:** New doped fibers allows for analysis of transverse modes amplification for user-defined refractive index profile and ion distribution.

### *Visualizers*

- **BER Test Set:** New component to generate, transmit ,and analyze bit error rates of large bit sequences.
- **Binary and M-ary Sequence Visualizer:** New visualizers display binary and m-ary sequences in time domain.
- **Convergence Monitor:** New component allows for monitoring power levels at multiple points in the system. It provides independent or synchronized monitoring.
- **Electrical Carrier Analyzer and Power Meter:** New parameters allows for scaling of power measurements.
- **Electrical Constellation Visualizer:** Additional options to exclude symbols from symbol error rate measurements.
- **Time Domain Visualizers:** New retracing option to create eye diagrams.
- **S Parameter Extractor:** New parameters to enter reference resistance and analyze negative frequencies.

### **Optimizations**

**Monte-Carlo Yield Estimation:** The new yield optimization can be used by designers to ensure designed systems can tolerate real-world variations.

The optimization involves simulating the design over a given number of trials in which the yield variables have values that vary randomly about their nominal values with specified probability distribution functions. Additional monitoring graphs were also added to single, multiple parameter and gain flattening filter optimizations.



## Simulation Scheduler

**Component Iteration Data Flow (CIDF) MT Scheduler:** Depending upon the degree or parallelization of a given system, the new simulation scheduler allows for the calculation of multiple components and visualizers simultaneously using multithreading.

## GUI and Integrated Design Environment

**Component Library:** Component library was reorganized to facilitate the process of finding, selecting, dragging and dropping of components.

**Visualizer Properties:** New apply button allows for refreshing of calculated results from visualizers without closing the properties dialog box.

**Access to Graph Values:** VB Script was extended so users can manipulate and customize graph values directly from component script.

## New applications and Validation Projects

Additional applications and validation projects were added to the OptiSystem sample files, including band amplification using Tm-doped fiber amplifier, Passive mode-locked fiber laser and much more.

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