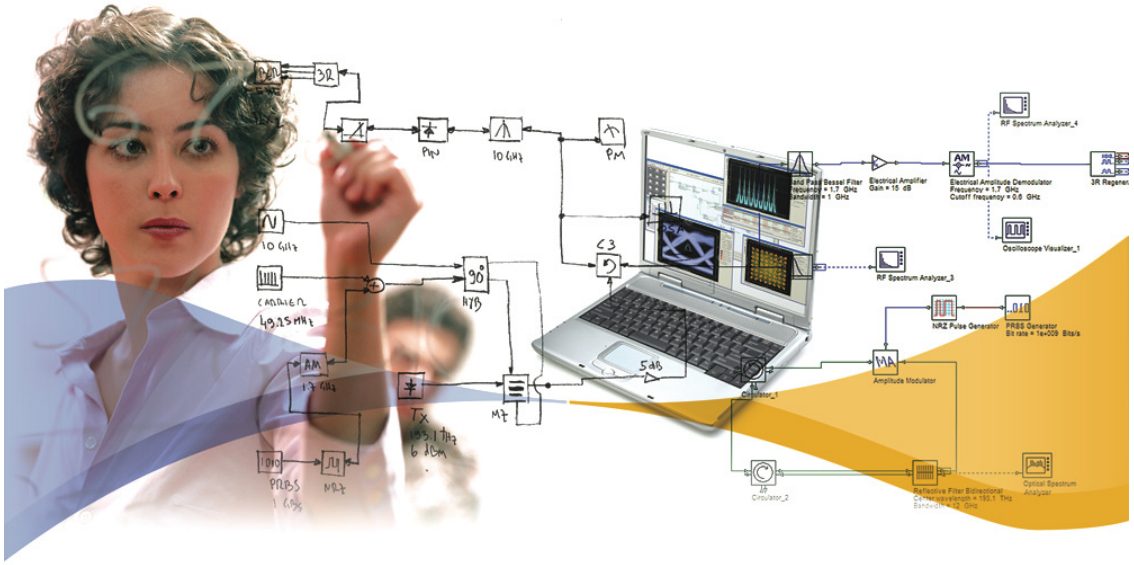

# OptiSystem 13

*Release plan (31 Oct 13)*

7 Capella Court
Nepean, ON, Canada
K2E 7X1

+1 (613) 224-4700
www.optiwave.com

# OptiSystem 13 planned features

Target availability
May/Jun 2014

- **Active semiconductor devices library (TLMM models)**
  - A new set of time-domain, active semiconductor device models, based on the **transmission line matrix method (TLMM)**, is planned for our **FP**, **DFB** and **VCSEL** models. The TLM models will provide enhanced characterization of transient and large signal events as well as provide an effective way to build multi-section components such as external cavity lasers.
- **Advanced modulation & high spectral efficiency systems**
  - New components are planned to allow for the creation of high capacity **super-channels** using **Nyquist-WDM** or **OFDM-based** techniques. Updates to the existing **OFDM modulators** are planned to provide more flexibility including allowing for the provisioning of different bit rates and modulation formats per sub-carrier.
- **Transmitter & receiver design**
  - Further improvements to the DSP portfolio are planned, including **non-linear impairment compensation** and support for **64-QAM/8-PSK** modulation formats. New/improved components are planned including an **arbitrary waveform generator**, enhancements to the **PIN/APD** models, and an updated **TIA** model
- **Optical fiber & waveguide models**
  - Several improvements to the single-mode and multi-mode fiber models are planned including an **empirical single-model** and **multi-mode** fiber model, enhancements to the **measured index multi-mode** fiber and the addition of a **polymer-based** fiber component
- **Other component additions and improvements**
  - Coherent integration of input modal fields for the **Encircled Flux** and **Spatial Visualizers**
  - A new **Set OSNR** test source
  - A new **90 deg hybrid** component
  - A new **Direct Detection Eye Pattern Analyzer**

# Active semiconductor devices

- **TLMM model introduction**
  - Several laser components (**FP**, **DFB**, and **VCSEL** models) will be updated to include an option to use the TLMM method to calculate the complex field envelope in the time-domain
  - The SOA library will also be updated to include new TLMM models for **SOAs** and **VCSOAs**
  - Several physical effects will be characterized, including non-linear effects (SPM/XPM), spectral and spatial hole burning, and 2-photon absorption.
  - The building block flexibility offered by the TLM method will permit users to build advanced configurations such external cavity lasers, passive/active mode locking, etc.
  - The ability to import material gain profiles is planned and will allow users to characterize advanced MQW and QD structure devices
- **Laser empirical model**
  - A new laser empirical model is planned that will allow users to rapidly integrate vendor-specified or measured results for semiconductor laser sources.
  - The model will include the ability to enter laser manufacturer specification sheets and import LI curves (vs. temperature) and modulation transfer function data

# Advanced modulation & high SE systems

- **Super-channel designs**
  - To support the design and analysis of high capacity Nyquist-WDM super-channel systems, the following component updates are planned:
    - Optical raised cosine filter (optical)
    - Flexible grid WDM multiplexer/de-multiplexer
    - Flexible grid single wavelength add/drop multiplexers
- **OFDM-based designs**
  - To support the continuing interest in developing OFDM-based solutions for high spectral efficiency systems, the following enhancements to the OFDM Modulators and Demodulators are planned:
    - The ability to provision different bit rates per user/sub-carrier
    - The ability to provision different modulation formats per user/sub-carrier
    - The ability to manually provision the frequency grid (including selecting or excluding specific frequencies)

# Transmitter and receiver design

- **DSP enhancements**
  - Following on the DSP updates from OptiSystem 12.2, the DSP 16-QAM and DSP QPSK will be integrated into a Universal DSP component thus allowing users to easily configure DSP algorithms for 16-QAM, 64-QAM, QPSK, 8-PSK and 16-PSK modulation systems
  - A new algorithm for the compensation of non-linear impairments will be introduced to provide further reach extension for long haul high capacity simulations
- **Arbitrary waveform generator**
  - A new Arbitrary Waveform Generator component is planned and will include a library of pre-defined waveforms, quantization and digital to analog conversion (DAC - interpolation)
- **Digital to analog (DAC) converter**
  - A stand-along DAC will be introduced to allow for the setting of customized sampling intervals
- **PIN/APD photo-detector update**
  - To keep pace with advancements in high bandwidth photo-detection, enhancements to the PIN and APD photo-detectors are planned and will include non-linear saturation and transient effects
  - Models for waveguide-fed or travelling wave photo-detectors will also be investigated
- **Trans-impedance amplifier (TIA) update**
  - To better align with manufacturer specifications, the TIA model will be updated to include parameters such as total input referred noise current

# Optical fiber and waveguide models

- **Empirical single-mode fiber model**
  - A simplified single mode fiber model is planned (modelling loss and dispersion) to allow for faster characterization and analysis. This component will also be useful for modelling single mode patch cords. A waveguide version will also be investigated.
- **Empirical multi-mode fiber model**
  - This new component will allows users to import modal field data (effective indices, coupling factors, group delays) to allow for more rapid calculations during multi-mode systems analysis. A waveguide version will also be investigated.
- **Measured index multi-mode fiber update**
  - The measured index multimode fiber component will be updated to include intra-mode coupling effects and support for polymer-based optical fiber types
- **Optical fiber time-domain model**
  - To allow for closed loop analysis (using individual samples), a new single mode fiber is planned that will use time-domain techniques to model linear impairments (such as chromatic dispersion)

# Further enhancements

- **Multi-threading**
  - For simulations involving multiple parameter sweeps a multi-threading capability is planned to allow for better use of multi-core computing resources.
- **External software interface component**
  - Similar in concept to the MATLAB component, this component will facilitate signal data exchange between an external SW program such as C++, Fortran or VBScripting and an OptiSystem design. Users will thus be able to perform calculations on the input signal(s) from OptiSystem and in turn export them back into OptiSystem through a file exchange.
- **Direct Detection Eye Pattern Analyzer**
  - A new **Direct Detection Eye Pattern Analyzer** component, with integrated PIN photo-detector, is planned.
- **Set OSNR**
  - A new compound component that will automatically configure and set the relative signal noise level for a communication test setup
- **90-deg hybrid**
  - A new compound component that will simplify coherent receiver configurations
- **Root raised cosine filter**
  - A new electrical domain filter component that will allow for the simulation of matched filter configurations
- **Coherent spatial analysis**
  - The spatial visualizer and encircled flux analyzer components will be updated to support the coherent integration of input modal fields