

Release Notes
OptSim, OptSim Circuit and ModeSYS
Version 2020.03

Photonic Solutions
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SYNOPSYS®

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Photonic System Tools Version 2020.03

OptSim and ModeSYS

PIC Design Suite Version 2020.03

OptSim Circuit

OptSim, and ModeSYS version 2020.03, include the following changes:

In today's ever-shrinking product development cycles, rapid technological advances often pose a challenge to the need for shorter times-to-market. To help strike a favorable balance between the technology learning curve and rapid prototyping, the following new application notes are added in version 2020.03.

- **New application notes and design files**

The application notes are productivity enhancing features with complete design files and relevant documentation that serve as an excellent starting point to manufacturable solutions.

- *Long-haul System Design with Remote Optically Pumped Amplifier (ROPA)*

Submarine cable and ultra-long-haul fiber-optic systems employ optical amplification without requiring regenerators. Due to the deployment and maintenance constraints, the optical amplifiers need to be remotely pumped, often reusing Raman pumps. The application note illustrates a system design with an optical amplifier pumped remotely from the receiving end by a backward-pumped Raman fiber of 100-km length.

Market: Long-haul fiber-optic telecom systems

- *Linearization of analog photonic radio-over-fiber (RoF) links with high suppression of third-order intermodulation distortion (IMD3)*

Compared to the traditional electronics and associated bottlenecks, microwave photonics provides stronger immunity to electromagnetic interference and larger data carrying capacity. The applications span civilian, defense and aerospace interests. The application note provides a design to highly linear RoF link using dual-drive, dual-parallel Mach-Zehnder modulator (MZM).

Markets: Radio-over-fiber, Aerospace & Defense

- *Receiver sensitivity comparison of NRZ and DPSK optical free-space communication systems*

5G requires smaller cell sizes and one of the proposed technologies for supporting intra-cell communication is via free-space optical transmission. The application note provides a free-space channel model and compares transmission of high-speed data using NRZ intensity and DPSK phase modulation methods.

Markets: 5G, Free-space optics

- Miscellaneous bug fixes, additions, and improvements

OptSim Circuit version 2020.03, include the following changes:

- **Enhancement to bidirectional multiport model**

One of the most common uses of this model is to characterize a passive photonic device in terms of its S-Matrix. The model is enhanced to now accept frequency and wavelength data recorded over non-uniform interval in addition to the existing ability to accept data recorded at uniform interval.

- **Enhancement to custom PDK simulation in OptSim Circuit**

OptSim Circuit custom PDK simulation is enhanced to accept group delay data from the S-Matrix/Custom PDK Generation Utility of RSoft Photonic Device Tools. Previously, the simulation required phase data. The benefit of the new enhancement is that the phase can be modeled more accurately even with coarser resolution than before.

- **New application notes and design files**

The application notes are productivity enhancing features with complete design files and relevant documentation that serve as an excellent starting point to manufacturable solutions.

- *PAM-4 Transmitter using segmented-electrode Mach-Zehnder modulator (SE-MZM)*

SE-MZMs have attracted a lot of attention lately for PAM-4 data center interconnect applications due to potential power savings by avoiding PAM-4 encoding in electronics. The application note provides design of a PAM-4 transmitter using segmented electrodes.

Market: Data Center Interconnects

- *Impact of inter-segment distance deviations in SE-MZM PAM-2 transmitters*

The deviation of segmented electrode phase shifters from intended positions can cause bandwidth of the transmitter. The application note examines impact of such variations on back-to-back received eye diagrams.

Market: Data Center Interconnects

- *Impact of segmented electrode time-delay variations in SE-MZM PAM-2 transmitters*

Packaging and placement of the PIC in a die can impact path lengths to electrical pads thereby affecting overall bandwidth of the transmitter. The application note examines impact of such variations on back-to-back received eye diagrams.

Market: Data Center Interconnects

- *Impact of capacitive charge and response time of segmented electrodes in PAM-2 SE-MZM transmitters*

The electrode parasitic plays a crucial role on overall response time and subsequently the bandwidth of the transmitter. The application note examines impact of capacitive charge and discharge times on the performance by examining back-to-back received eye diagrams.

Market: Data Center Interconnects

- *Si-waveguide Absorption-based Methane Gas Sensor PIC*

Due to the recent advances in materials, nanostructures, and silicon technologies, the photonic integrated circuits (PIC) are becoming increasingly widespread in a number of applications. The application note demonstrates modeling of a silicon photonic sensor chip design for detecting Methane and performs Allan deviation analysis of the detection data.

Market: Sensors

- **Miscellaneous bug fixes, additions, and improvements**

Licensing Updates and Operating System Support Changes

- **Licensing Updates:**
 - New optional licensing implementation for the RSoft Photonic Device Tools, Photonic System Tools, and OptSim Circuit that does not require installing Photonics Solutions software on the SCL license server. This is particularly useful in Linux environments

where SCL may be managed by IT; the installation process is documented in the Linux chapter of the Installation Guide. For information about using on Windows, contact photonics_support@synopsys.com.

- Updated automatic installation routine to set the SCL Vendor Port to 27021 by default.

- **Important Platform Support Notice for Windows 7 and Legacy Linux Versions:**

Photonic Solutions products versioned 2020.03, as well as any 2020.03 service releases, will be the last versions to officially support both Windows 7 and RedHat/CentOS 6.5 or older. This includes the RSoft Photonics Device Tools, Photonic System Tools, and the PIC Design Suite. For Linux, there will be no support for Linux versions with a kernel older than 2.6.32-504 and glibc older than 2.12; you can find the glibc version of your system by running the command "ldd --version" in a terminal; the kernel version can be found via the command "uname -r".