OptiSystem 21.0 Release Notes

IMPORTANT - PLEASE READ ME

Installation Notes:

- If you have an earlier major version of OptiSystem on your computer, OptiSystem 21.0 will be automatically installed in a separate directory.
- OptiSystem 21.0 includes the option to install OptiSystem samples during (or at any time after) installation. The samples are installed by default in the folder "C:\Users\USER NAME\Documents\OptiSystem 21.0 Samples\"). If you have saved any projects to the target installation location it is highly recommended to save this folder to a backup folder).

Minimum hardware and software requirements

OptiSystem requires the following minimum/recommended system configuration:

- Minimum PC configuration: PC with Pentium processor (E6, G Series) or equivalent.
- 8GB RAM.
- Recommended PC configuration: PC with a clock speed > 2 GHz with 2-4 cores (e.g. Intel i5, i7, i9 or equivalent AMD) and 16GB RAM or more.
- Operating Systems: Microsoft Windows 10, Windows 11, and Windows Server2022 (**64-bit only!**)
- **Microsoft has shelved Windows 7**, we are dropping Windows 7 support starting this release. However, the software might run under Windows 7, but we do not guarantee it and we will not be able to provide technical support for bugs/crashes.
- 2 GB free hard disk space.
- 1280 x 1024 graphic resolution

Application execution

- Administrators: when installing OptiSystem for users with Restricted User Profile, install the sample files in a folder where these users have Read/Write access. By default, the sample files are installed in the current user's Document folder. OptiSystem requires the read/write file access and will not work with read-only files.
- There are some MATLAB files (xxxxx.m) included that are necessary to make the samples work properly. **An important point** - there is no need to update the path in the MATLAB search path (Main tab of the MATLAB component) as long as the Matlab file exist in the same directory as OptiSystem project. If the Matlab file is not in the same the directory of OptiSystem project, then an updated path to the MATLAB files is necessary, otherwise the samples will not work. The same applies to the Scilab component in the Scilab/bin folder.
- For OptiSystem Help feature to function properly, Adobe Acrobat Reader must be installed. To get the latest version please visit the Adobe website at http://www.adobe.com/.
- Some computers are configured in power saving mode to go to Hibernation or Sleep mode when they are not in use. **It is recommended to disable this feature**, especially when running unattended lengthy simulations. Typically, after the simulation is complete, the computer idles and eventually goes to Hibernation. This

causes the licensing platform drivers to invalidate the license. When the computer wakes up and resume its execution, OptiSystem software will issue a message that the license is not available and terminate, losing the simulation results in the process. Please disable the computer hibernation feature to avoid this problem.

OptiSystem Version 21.0 list of updates

Components

Table 1: New Components

Component	Library	Changes/Update
Digital Comparator	Default/Signal Processing Library/Tools/Binary//	The component compares a bit or group of bits of two sequences and provide the number of matched bit(s) and number of mismatched bit(s).
Serial to Parallel Converter Bits Grouping 1XN	Default/Signal Processing Library/Tools/Binary//	The component splits the incoming bit sequence into N-branches by passing a bit or group of bits to each branch sequentially.
LOS Underwater Channel	Default/Free Space Optics/	This component can be used to investigate signal transmission in different waterbodies when the transmitter and receiver telescopes are in line-of-sight.
NLOS Underwater Channel	Default/Free Space Optics/	This component allows users to investigate under water signal transmission for reflective signal from the water air surface when no waves present in the different waterbodies.
Nonlinear FBG	Default/Filters Library/Optical/FBG//	This component is a compound component used to enable switching feature of the FBG using nonlinear effects.
Tilted Fiber Grating	Default/Sensors/	This component is a standalone one that allows users to design tilted short period and long period gratings.
Pulses Polarization Meter	Default/Visualizer Library/Optical/	This visualizer allows users to monitor the state of polarization of each optical pulse in the sequence of pulses in reference to an input binary sequence or in reference to set threshold power level.
SPD	Default/Receivers Library/Photodiodes/	The Single Photon Detector (SPD) component detects very lower-level signals and provides the photon count for the input and noise signals for a desired capture time.

Other features and improvements

Features	Changes/Updates
M-ary Raised Cosine Pulse Generator	Non-power of two field is added to **the** component in the **Main** tab. The field can be swept, scripted or normal. The parameter is scripted with the global parameter field.
Python/Matlab/Scilab	Users can calculate the Python/Matlab/Scilab component in OptiSystem project without a need to load a path to Python/Matlab/Scilab file in component as long as the third-party file exist in the same directory of OptiSystem Project.
Visualizers	The Update Visualizers… field accessed from the right click is removed and Enable/Update Visualizers… is added instead to allow enabling and updating the visualizer at the same time.
VB Script	Users can add the layout name when using VB scrip and run the VB script per that name instead of the old way, where the script can be run only from the active (selected) layout.
Dual Port Binary Sequence Visualizer	New results are added to the visualizer to enable QKD. That includes the number of ones and zeros for each input port and the number of matched ones and zero between the two ports.
Binary Sequence Visualizer	New results are added to the visualizer to enable QKD. That includes the number of ones and zeros in the input sequence.
Digital Optical Switch	Sequence of bits can be used to control the switching process in the component.
FSO Weather Condition	Wet and dry snow weather condition attenuation calculation at different wavelength is added to the component.
Library Management	New description for many components is added in the Library Management. The management Library can be accessed from the Tools bar when there is no project opened.
TDECQ	The values of the optimized filter tabs coefficients are added to the Results of the visualizer when optimization is enabled.
OptiSystem GUI Tool bar	Add titles to the component control icons in the GUI tool bar. Currently only the component properties has title. The user needs to select a component, then use the icons to access component properties window, component results, component script, component view and component Help.

Documentation

Document	Changes
Mode Combiner	Details on the Summed Mode parameter operation is added. If **Retain Spatial Information** parameter is True, the spatial information of all input modes are summed and treated as a single temporal optical field with single spatial mode. First, the power of each mode coming into the component is normalized, then the sum of all modes is present on top of the temporal sampled signal.
Binary Sequence Visualizer	The data sheet of the Visualizer is edited by adding to the results the Number of ones (bits) and Number of zeros (bits) present at the input port.
Dual Port Binary Sequence Visualizer	The data sheet of the Visualizer is revised by adding to the results the Number of ones (bits) and Number of zeros (bits) that present at each port as well as the Number of matched ones and zeros. The comparison is done on a bit-by-bit bases and when only the bit rate and the sequence length of the incoming binary signals are equal.
Digital Optical switch	The datasheet of the switch is edited to describe the new feature that allows users to control the switching of input signals using a sequence of bits instead of a single of bit control.

Coupler Bidirectional	The definition of the variable B in the datasheet of the component is added as the Signal operating Bandwidth parameter. The range for B is increased to 1000nm from 200nm. Equation 5 is edited by using 0.5 instead of 2. Equations 1, 4, and 5 are edited in the datasheet of the coupler to reflect the new changes made to resolve a bug in the component transfer function implementation of IL, RL and coupling for cosine case.
Spectral Light Source	The datasheet for the source is edited to show how to load the user defined solar spectrum.
MZM Modulator Analytical	The data sheet of the modulator is edited by renaming the variable ER in the equations to avoid confusion with the well known parameter extinction ratio.
FSO Weather Condition	The data sheet is edited by adding new equation for dry snow and edit the options for Precipitation types to include Snow-wet and Snow-dry.
FSO Channel	Equation (7) in the datasheet of the FSO Channel component is edited to have the correct term $\log(\sigma_R^2 +1)$.
APD/Photodiode PIN	Equation 11 in the datasheet of the APD component and equation 10 in the datasheet of the Photodiode PIN are edited by dividing the terms in the equations by Δt not multiplying, where Δt equals 1/bandwidth
Electronic Equalizer	The datasheet for the equalizer component is updated by adding more details for the adaptive equalization to make it easier to setup and operate.
TDECQ	The values of the optimized filter tabs coefficients are added to the results of the TDECQ visualizer.
Digital Comparator, Serial to Parallel Converter Bits Grouping 1XN, LOS Underwater Channel, NLOS Underwater Channel, Nonlinear FBG, Tilted Fiber Grating, Pulses Polarization Meter, SPD.	Add new datasheets.
Getting Started	The steps to create a set of frames or a video for images of visualizers are added to the Getting started document.
Universal QAM DSP	The fields AE Number of precursors and AE Tabs per UI are added to the datasheet of Universal QAM DSP component.

OptiSystem Version 21.0 Fixes

Additional release notes issues

a. The field PAS sizing (non-power-of-two) in OptiSystem project main layout in the older versions is edited to PAS sizing no power of two to allow scripting this parameter in relevant components.
b. The frequency shift of the filter center frequency of loaded measured data in the **Measured Optical Filter** is fixed. Users load measured filter frequency response and they would like to operate the filter at another center frequency. Older versions of OptiSystem did not make the shift in the center frequency correctly.
c. The equations used in the **Coupler Bidirectional** component are modified to correctly create the transfer function of the coupler while achieve power conservation.

d. The effect of wavelength dependence of attenuation under snow condition in the FSO Weather Condition component is fixed and new equation is added for dry now.Also, the error message that appears when changing the wavelength is resolved.
e. The process of installing and uninstalling of OptiSystem and OptiPerformer are decoupled to avoid possible crash when uninstall of OptiPerformer.

Examples Library

A new directory called **Vendors Datafiles** is added to the **Optical amplifiers** directory in the Example Library. The first vendor added is **Coractive**. Two datafiles for erbium-doped fibers are added with an example using the parameters in designing an L-band EDFA amplifier. Users needs to copy the relevant data and create the proper datafiles to load to the **Er Doped Fiber** component.

1. The example (EDFA Fiber_Coractive PDV_SCFER612514.osd) is added to OptiSystem Example Library at the location C:\Users\USER NAME\Documents\OptiSystem 21.0 Samples\Optical amplifiers\Vendors Datafiles\Coractive\.
2. The example (NL_FBG_Component.osd) is inserted in OptiSystem Example Library at the location C:\Users\USER NAME\Documents\OptiSystem 21.0 Samples\Component sample files\Filters Library\Optical\FBG\.
3. The example (Pulses Polarization meter for pulses with different polarization states.osd) is added to OptiSystem Example Library at the location C:\Users\USER NAME\Documents\OptiSystem 21.0 Samples\Component sample files\Visualizer Library\Optical\.
4. The example (Polarization effect in TFG_JA_Fig7.osd) is inserted in OptiSystem Example Library at the location C:\Users\USER NAME\Documents\OptiSystem 21.0 Samples\Sensor systems\TFG\.
5. The example (Radiation effect in TFG_Koyamada_Fig4.osd) is added to OptiSystem Example Library at the location C:\Users\USER NAME\Documents\OptiSystem 21.0 Samples\Sensor systems\TFG\.
6. Four new lessons are added to the **Introductory tutorials** directory at the location C:\Users\USER NAME\Documents\OptiSystem 21.0 Samples\Introductory tutorials\. All lessons in this location are described in OptiSystem_Tutorials_Volume_1.pdf.
7. The example (RSolar Light Source.osd) and the Solar spectrum data file are added to OptiSystem Example Library at the location C:\Users\USER NAME\Documents\OptiSystem 21.0 Samples\Component sample files\Transmitters Library\Optical Sources\.
8. The example (SLED.osd) is inserted in OptiSystem Example Library at the location C:\Users\USER NAME\Documents\OptiSystem 21.0 Samples\Component sample files\Transmitters Library\Optical Sources\.
9. The example (PM operation.osd) is added to OptiSystem Example Library at the location C:\Users\USER NAME\Documents\OptiSystem 21.0 Samples\Component sample files\Transmitters Library\Modulators\Optical\.
10. The example (FSO Channel With Component Script Editing.osd) is inserted in OptiSystem Example Library at the location C:\Users\USER NAME\Documents\OptiSystem 21.0 Samples\Optical wireless\FSO\.

11. The example (Multimode WDM Spatial and Temporal System Settings.osd) is added to OptiSystem Example Library at the location C:\Users\USER NAME\Documents\OptiSystem 21.0 Samples\Multimode systems\.

12. The example (10Gbps transmission using DCF.osd) is inserted in OptiSystem Example Library at the location C:\Users\USER NAME\Documents\OptiSystem 21.0 Samples\Fiber analysis and design\DCF (Standard) optical fiber data files\.

13. The example (8DWDM Channels 112Gbps Coherent DP-16QAM_Trans with DSP.osd) is added to OptiSystem Example Library at the location C:\Users\USER NAME\Documents\OptiSystem 21.0 Samples\Advanced modulation systems\QAM systems\16 QAM\.

14. Seven new examples are added to characterize the single photon detector component (SPD). The examples are inserted in OptiSystem Example Library at the location C:\Users\USER NAME\Documents\OptiSystem 21.0 Samples\Component sample files\Receivers Library\Photodetectors\.