OptiSystem 21.1 Release Notes

IMPORTANT - PLEASE READ ME

Installation Notes:

- If you have an earlier major version of OptiSystem on your computer, OptiSystem 21.1 will be automatically installed in a separate directory.
- OptiSystem 21.1 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 21.1 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.
- The Python environment supported in this version is 3.12.
- 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 21.1 list of updates

Components

Table 1: New Components

Component	Library	Changes/Update
Wideband Travelling Wave Pulsed SOA	Default/Amplifiers Library/Optical/SOA/	This component allows applying alternating injection current to bias the SAO in addition to the DC current option.
Transimpedance Nonlinear Amplifier	Default/Amplifier Library/Electrical/	The component is created as a spin-off the Transimpedance Amplifier component. The new component allows users to enter nonlinear gain for the input voltage to the third order.
Mirror	Default/Passive Library/Optical/Reflectors/	This component has four reflection models including wavelength independent, wavelength dependent, cosine profile and load data file. It also handles surface roughness, which is enabled for wavelength dependent case.
Convert JSON to data Files	Default/Tools Library/	This component converts a file with data saved in JSON format to .dat file format.
Convert Data to JSON Files	Default/Tools Library/	This component converts a file with data saved in .dat file format to JSON format.
Index Refraction Structure Altitude (Cn^2)	Default/Free Space Optics/	This Component is created to address the effect of scintillation at different altitudes. The component is a stand-alone one which has seven models that can be selected.
Single Photon Pulsed Laser	Default/Transmitters Library/Optical Sources/	This component is created to enable the transmission of a desired number of photons over a medium. The component is a key one to address quantum applications.
UWB Antenna	Default/Passives Library/Electrical/ Microwave Photonics/	This component is created to enable the transmission of microwave signals in the system.

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Component	Library	Changes/Update
Photonic Power Converter (PPC)	Default/Receivers Library/Photodetectors/	The PPC component is created to convert optical light into electricity to power electronic circuits remotely. It enables power-by-light systems that can be used for providing electricity to high-altitude platforms (HAPs) or remote radio heads (RRHs) in 5G and 6G applications.

Other features and improvements

Component/Feature	Changes/Updates
Optical Time Domain Visualizer (OTDV)	An autocorrelation tab is added for the OTDV to display the autocorrelation of the input signal. The autocorrelation display will be visible once this feature is selected in the OTDV properties window
Dual Port Optical Time Domain Visualizer	An “Autocorrelation Double View” tab is added for the Dual Port OTDV display window to show the autocorrelation of each input signal. A cross-correlation calculation feature is added for the two input signals that are applied to the Dual Port OTDV. This feature needs to be selected in the visualizer’s properties window. Also, a “Cross-correlation Single View” tab is added to the display window of the visualizer.
FSO Channel, LOS Underwater Channel, NLOS Underwater Channel	The range of the “Transmitter loss” and “Receiver loss” parameters for the FSO Channel, LOS Underwater Channel and NLOS Underwater Channel components are changed from [0, 1e10] to [-1e10, 1e10] to allow adding gain effect for these components if needed. This option is important when you have cascaded FSO channels, each with short distances that cause attenuation. This effect is not realistic when implemented in real systems. The TX and RX telescopes will create either loss or gain depending on heir dimensions in addition to the range and divergence angle.
Matlab, Python, CPP, Scilab, Equipment Comm and Control	New variables and units’ conversion are added to the Matlab, Python, Scilab, Equipment Comm and Control and CPP components as well as to the main layout window. These variables include current, resistance, inductance, capacitance, voltage, gain_AmpV/I, gain_power, speed, reflection, area. This improvement allows users to exploit these variables and units in their codes supported by external software.
Parameter Sweep	Linear spreading of integer parameters is added to sweep the parameter in a range set by Start and End values. The old implementation does not allow spreading of integer parameters.
Reflection	The possible units for the newly added parameter Reflection are %, dB, and UL (unitless) where the unit dB = $10*\log_{10}$ (UL).
Optical Amplifier Measured	The GainAndNF.dat file can be modified to create nonlinear gain optical amplifier. That can be achieved by sweeping the parameter Gain and noise figure file name allowing loading multiple files of GainAndNF.dat to tailor the amplifier output versus input (gain) characteristics.

Documentation

Document	Changes
FSO Channel, OWC Channel	The power for the term in the denominator of equation (3) and equation (7) for alpha parameter in the gamma-gamma scintillation case is changed to 7/6 from 5/6 according to reference #4 in the datasheet of the FSO Channel and OWC Channel components, respectively. Please note that the power is correct in the code in OptiSystem..
FSO Channel	The datasheet of the FSO Channel component is edited to reflect the correct equation for the Log-Normal (LN) scintillation distribution, which is not the normal distribution. Please note that the implementation in the component is correct.
Optical Amplifier Measured	The datasheet of the Optical Amplifier Measured is edited to explain to users that they can add any number of data rows in GainAndNF.dat file. Loading this file updates the field “Measured gain and noise figure (nm dB dB)”. The default size for this parameter is 11x3.
Reflector Bidirectional	The datasheet of the Reflector Bidirectional component is edited to fix the description of the Min. reflection parameter as “Component reflection outside the operating wavelength range of the reflector that is set using the Operating wavelength and Bandwidth parameters above”. Also, add the unit UL (unitless) to the units of Reflection and Min. reflection parameters to represent the reflection as decimal (e.g. 0.99). Note, the unit dB is $10*\log_{10}(UL)$.
Transimpedance Amplifier	The datasheet of the Transimpedance Amplifier is edited to fix the units of Open loop voltage gain to be either UL (Unit-less) or dB. Also, the unit’s option of the Input noise density is changed to $A/Hz^{-1/2}$ instead of A/Hz^{-1}.
FSO Channel, LOS Underwater Channel, NLOS Underwater Channel	The range of the “Transmitter loss” and “Receiver loss” parameters for these components are changed from [0, 1e10] to [-1e10, 1e10]. Also, the ranges for some parameters with missing values are added
Wideband Travelling Wave Pulsed SOA, Transimpedance Nonlinear Amplifier, Mirror, Convert JSON to Data Files, Convert Data to JSON Files, Index Refraction Structure Altitude (Cn^2), Single Photon Pulsed Laser, UWB Antenna, Photonic Power Converter (PPC).	Add new datasheets.

OptiSystem Version 21.1 Fixes

Additional release notes issues

a. A crash in the **Electrical Eye Viewer** occurs when the **Symbol rate** parameter in the Main tab of properties window is set in **Normal** Mode instead of **Script** Mode. The issue is due to the unit used for the parameter. There was no sym/s unit defined in the software. It has been added to the Symbol rate parameter and the issue is resolved.

b. The **Reflector Bidirectional** component operation when setting the **Min. reflection** parameter is to reflect the incident signal outside the operating wavelength/frequency range that is set through the **Operating wavelength** and **Bandwidth** parameters. In old versions of OptiSystem when the **Min reflection** parameter is higher than **Reflection** parameter, the device reflection within the operating range is set by multiplying the

Reflection parameter and **Min. reflection** parameter, which is not correct. This issue is resolved by making the Reflection and Min reflection parameters independent.

Examples Library

1. A note is added to the PAS PAM3/5/6 files in OptiSystem Example Library at the location (C:\Users\USER NAME\Documents\OptiSystem 21.1 Samples\Advanced modulation systems\PAS Systems\XBYS\) to guide the user to load the relevant .txt file to operate the examples.
2. The data file (GainAndNF.dat) is added to the example library at the location C:\Users\USER NAME\Documents\OptiSystem 21.1 Samples\Optical amplifiers\EDFA models and analysis\Data Files\. The file is used in the Optical Amplifier Measured to the set the gain and NF at different wavelengths.
3. The example (Autocorrelation feature calculation in OTDV.osd) is added to OptiSystem Example Library at the location C:\Users\USER NAME\Documents\OptiSystem 21.1 Samples\Component sample files\Visualizer Library\Optical\.
4. The example (Cross-correlation feature calculation in Dual Port OTDV.osd) is added to OptiSystem Example Library at the location C:\Users\USER NAME\Documents\OptiSystem 21.1 Samples\Component sample files\Visualizer Library\Optical\.
5. The example (CW versus modualted signal_SBS threshold.osd) is added to the Example Library at the location C:\Users\USER NAME\Documents\OptiSystem 21.1 Samples\Fiber analysis and design\Optical Fiber Nonlinearity\SBS\.
6. The example (High Power Ytterbium Double Clad Amplifier.osd) is added to the Example Library at the location C:\Users\USER NAME\Documents\OptiSystem 21.1 Samples\Optical amplifiers\Yb doped fiber models\.
7. The example (Single Photon Laser (SPL).osd) is added to the Example Library at the location C:\Users\USER NAME\Documents\OptiSystem 21.1 Samples\Component sample files\Transmitters Library\Single Photon Laser\.
8. The example (WDM System using DFB lasers.osd) is added to the Example Library at the location C:\Users\USER NAME\Documents\OptiSystem 21.1 Samples\Component sample files\Transmitters Library\Optical Sources\.
9. The example (Wideband Travelling Wave Pulsed SOA.osd) is added to the Example Library at the location C:\Users\USER NAME\Documents\OptiSystem 21.1 Samples\Optical amplifiers\Semiconductor optical amplifiers\.
10. The example (Photonics Power Converter (PPC).osd), measured dark and Light IV data files for single junction Photonic Power Converter device are added to the Example Library at the location C:\Users\USER NAME\Documents\OptiSystem 21.1 Samples\Component sample files\Receivers Library\Photodetectors\Photonic Power Converter (PPC)\.
11. The example (Optical Amplifier Measured Linear.osd) is added to the Example Library at the location C:\Users\USER NAME\Documents\OptiSystem 21.1 Samples\Optical amplifiers\EDFA models and analysis\.
12. The example (Optical Amplifier Measured_Nonlinear Gain.osd) with its data files are added to the Example Library at the location C:\Users\USER NAME\Documents\OptiSystem 21.1 Samples\Optical amplifiers\EDFA models and analysis\Optical Amplifier Measured_Nonlinear Gain\.
13. The example (Direct Detection OFDM 4 QAM Transmission System with UWB Antenna.osd) with related datafile is added to the Example Library at the location C:\Users\USER NAME\Documents\OptiSystem 21.1 Samples\Microwave and RoF optical systems\UWB Antenna\