OptiSystem 18.0 Release Notes

IMPORTANT - PLEASE READ ME

Installation Notes:

- If you have an earlier major version of OptiSystem on your computer, OptiSystem 18.0 will be automatically installed in a separate directory.
- OptiSystem 18.0 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\username\Documents\OptiSystem 18.0 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 8.1/10 (**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.
- 1.5 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. Another important point - the path in the MATLAB search path (Main tab of the MATLAB component) has to be updated with the path to the MATLAB files, otherwise the samples will not work.
- The path to the Scilab/bin folder has to be added to Scilab component (a parameter field has been created for this purpose), otherwise the Scilab component library will not work.
- For the 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 18.0 list of updates

Components

Note: No new component is added to OptiSystem version 18.0.

Other features and improvements

Features	Changes/Updates
GN-Model component	OptiSystem version 18.0 allows users to simulate BPSK modulation; when one bit per symbol is used.
View Signal Visualizer	Users can save the results of each iteration using the View Signal Visualizer. The saved file's name is created automatically and it is saved either in the Results directory in the Example Library or in the Temp directory located at C:\Users\USERNAME\AppData\Local\Temp\OptiSystemTempDir\ViewSignalData
Parameter Sweep	OptiSystem 18.0 allows the swept parameters in the different components to appears in clusters and in order in the **Parameter Sweeps** popup window. This feature makes it easier to copy data into the popup window.
OTDR component	A dB unit is added to the y-axis title (Normalized Intensity) of the OTDR component graph.
OptiViewer2 package	OptiViewer2 software package is added to OptiSystem 18.0 installation package to allow users viewing the 3D-graphs and use the component Save Transverse Mode for saving the modes in the project at the desired location.
Python plotting files	The files (plot3DGraph_withMayavi_Surf_exam1.py, plot3DGraph_withMayavi_Surf_exam2.py, plot3DGraph_withMayavi_Surf_exam3.py) are removed from the **Example Library** due to the absence of support by Python newest versions.
Python installation	An embedded folder for Python software and related plotting packages is created in OptiSystem 18.0 as part of the installer. This process saves time to users and guarantees the operation of all provided Python examples in the Example Library
Obsolete filter component	The following **obsolete optical and electrical filters** are removed from the components' database in OptiSystem 18.0 GUI to avoid appearing during using the search feature for components. **Bandpass IIR Filter** (Electrical), **Inverted Optical IIR Filter, Optical IIR Filter** (Optical), **IIR Filter** (Electrical)
LiFi Channel component	A new parameter "Step" has been added to the **LiFi Channel** component in the **System Dimensions tab** of the component properties popup window. A verification on the validity of the set parameters X & Y dimensions and Step is added to the LiFi Channel component properties popup window to guarantee that the Step multiplied with the dimensions is greater than 3. This guarantee that the **Power distribution** calculation produces meaningful results, especially when the room dimensions (X & Y) are not equal or when either dimension is relatively too small.
Detected Eye Analyzer Visualizer	The Directly **Detected Eye Analyzer Visualizer** (optical) is moved from Default/Visualizer Library/Electrical to Default/Visualizer Library/Optical in OptiSystem 18.0.
Test Sets	The **Test Sets** library is moved to the Default/Visualizer location.

Documentation

Document	Changes
EA Modulator Measured	A new reference is added to datasheet of the EA Modulator Measured component.
GN-Model component	The datasheet of the GN-Model component is edited to reflect allowing BPSK modulation format and makes the range for Bits per symbol between 1 and 10.
APD component	The datasheet of the APD component is edited by removing the Frequency response model material s it is not supported.
OTDR component	The range for the “Number of return loss points” parameter in the OTDR component properties popup window is edited to start from 0. This change allows single optical fiber OTDR simulation.
EA Modulator Measured component	The file **AbsorptionAlpha.dat** is added to the folder C:\Users\USERNAME\Documents\OptiSystem 18.0 Samples\Component sample files\Transmitters Library\Modulators\Optical. This file has the required data for the **EA Modulator Measured** component. The data is organized as (voltage (V), Absorption (dB), Voltage (V), a-Parameter).
Digital Optical Switch component	The datasheet of the Digital Optical Switch is edited to explain its operation. The switch operates only for single bit not a sequence of bits. Thus, the status of the switch varies based on the first bit in the sequence applied to its Control port.
LiFi Channel component	A new parameter **Step** is added to the LiFi Channel component properties window. The range for the Step is between 1 and 1000. A verification on the validity of the set parameters X & Y dimensions and Step is added to the LiFi Channel component properties popup window to guarantee that the Step multiplied with the dimensions is greater than 3.
Dual Drive MZ Absorption-Phase, Single Drive MZ Modulator Absorption-Phase, **Dual Port Dual Drive MZ Modulator Absorption-Phase components**	The datasheets of these components have been edited by adding the following statement. “These data (Absorption and Phase) took into account the MZ modulator interaction length of 600mm [1]”.
Measured-Index Multimode Fiber	The refractive index equation in the datasheet of the **Measured-Index Multimode Fiber** is edited according to the following equation: $$n(r) = \begin{cases} n_1\left(1 - 2\,\Delta\,(\frac{r}{a})^{\alpha}\right)^{\frac{1}{2}} & r < a \quad (core) \\ n_1(1 - 2\,\Delta)^{\frac{1}{2}} = n_2 & r \geq a \quad (cladding) \end{cases}$$
Obsolete Filters	**The obsolete optical and electrical filters** are removed from the component database in OptiSystem GUI when using the search feature. Their datasheets are also removed from the **Component Library document.**These filter are the Band pass IIR Filter (Electrical), Inverted Optical IIR Filter (Optical), Optical IIR Filter (Optical) and IIR Filter (Electrical).
Analog Filters	The Fields related to **Digital Filter** in the different analog filters have been removed from the Simulation tab in those components’ properties popup window as it is not relevant.

Nonlinear Optical Fiber and Bidirectional Optical Fiber components	The sentence “The four-wave mixing effect between multiple sampled signals is not considered” is removed from the datasheets of the **Nonlinear Optical Fiber and Bidirectional Optical Fiber components**. The FWM effect is automatically calculated once XPM is selected.
LOS Channel component	The range in the **LOS Channel** component is edited to 1e-100 and 1e5m because the Loss is undefined when the range is 0m according to the following equation. Also, the user needs to choose practical parameters to avoid the cases where gain is achieved instead of Loss. $$Loss = \frac{(m+1)A_d}{2\pi h^2} Gain (\cos\theta)^m \cos\phi$$
FSO Channel components	The datasheet of the **FSO Channel** component is edited by adding a statement asking the users to choose practical parameters to avoid cases where Gain is achieved instead of Loss for the channel especially when the range is less than about 40m and the other parameters are set to default in the component properties popup window.
Directly Detected Eye Analyzer Visualizer	The datasheet of the **Directly Detected Eye Analyzer Visualizer** by changing its input port from Electrical to Optical.
LED and White Light Source components	The datasheets of the **LED and White Light Source** are edited to describe the process of increasing the display of their used bandwidth. That can be done by either increasing the bit rate in the project layout popup window or the Sample rate in the Simulation tab of the component properties popup window.
Detected Eye Analyzer Visualizer	The datasheet of the Directly **Detected Eye Analyzer Visualizer** (optical) is edited by changing the Input port from Electrical to Optical.

OptiSystem Version 18.0 Improvements & Fixes

Additional release notes issues

a. The **OSNR component** is not working properly in version 17.1 due to changes made in its base component (White Light Source), where the PSD (dBm/Hz) is separated from the average power (dBm). This issue is fixed in OptiSystem 18.0. The script of the Average power is moved to the Power spectral density field and the PSD is selected

b. The calculation in the **Decision component** is not correct when there is no DSP in front of the it. A new field “DSP” is added to the **Decision component** to allow users to select the DSP option to represent its presence or not in front of the decision component because the algorithm used in the decision component is different in each case. When DSP option is True, hard coded levels (E.g. -2, 0, 2) for threshold decision (E.g.16 QAM) is used and when it is False the thresholds are calculated from the received signal and noise.

c. The Number of Reflections in the “Number of return loss points” of the **OTDR component** used in the OTDR examples in the Example Library of older versions can’t be set to 0. This issue is resolved in release 18.0 and the parameters in the examples can be modified to zero. Also, the new release allows the user to setup single fiber piece because the old releases do not allow “no data” in the “Connections between fiber cables” field in the “Fiber Cables Connections tab of the component properties popup window. A quick check on the setting is added to make sure that the parameters in this component is entered properly.

d. Single fiber piece OTDR simulation using the OTDR component is not working in older versions. The issue is resolved in OptiSystem 18.0. This means that the “Number of splices” could be set to 0 and the “Number of return loss points” can be also set to 0, too. When the number of splices is 0, the splice loss becomes gray because this field will be irrelevant.
e. A dB unit is added to y-axis title “Normalized Intensity” of the OTDR graph because it is missing in older versions.
f. The GN-model in OptiSystem 17.1 doesn’t support BPSK. The range of the Bit per symbol is changed to allow BPSK modulation, where there is one bit per symbol. A new equation for calculating BER of BPSK in the component is added and have ½ factor in it compared to other mPSK.
g. The “Reference wavelength” in the Main tab of the **GN Model component** cannot be changed in older versions when it is in nm. This issue is fixed in this release.
h. The issue related to the calculation of OptiSystem **Python** example (OpticalAttenuatorComponent.py) in older versions is fixed. It is related to the version of Python. Current release uses version 3.8.7.
i. The selected swept parameters are not displayed in the saved file for every iteration in older versions. It displays only the first value of the swept parameters.This is fixed in OptiSystem 18.0
j. The examples of OptiSPICE co-simulation are edited to allow calculation in OptiSystem 18.0
k. A freezing issue comes from Microsoft IME causing OptiSystem to freeze. Please refer to the following web site and find the workarounds.https://www.graphpad.com/support/faq/freeze-with-japanese-chinese-ime/. In current Win 10, there is a check box to turn on the compatibility with old IMEs. Once it is checked, the freeze issue disappears.
l. The Fields related to Digital Filter for all analog optical and electrical filters have been removed from the Simulation tab in the component properties popup window as it is not relevant.
m. The Power distribution calculation in the LiFi caused the failure to produce meaningful results when the room dimensions (X & Y) are not equal or when any dimension is too small. A new parameter “Step” has been added to the component in the System Dimensions tab of the component properties window. A check condition is added in the component properties window for the X & Y dimensions and step parameters to guarantee that the step multiplied with the dimension is greater than 3.
n. The RBW does not work for the Dual Port Optical Spectrum Analyzer and caused a crash when there are negative frequencies present in one of the two signals, which has different array size. This issue has been fixed in OptiSystem 18.0
o. The range in the LOS Channel component is edited to be between 1e-100 and 1e5m because the Loss is undefined when the range is 0m according to the following equation

$$Loss = \frac{m+1 \cdot A_d}{2 \cdot \pi \cdot h^2} \cdot Gain \cdot (\cos\theta)^m \cdot \cos\phi$$

Examples Library

1. All examples that use PSD and average noise power in them are checked and updated due the use of wrong power level for OPSD in version 17.1. The script of the average power field in the old version is copied and scripted in the PSD field in version 18.0 the PSD option is selected. All examples give correct results in OptiSystem 18.0.
2. The example (MCF crosstalk consideration.osd) is added to the example library in the folder C:\Users\USER NAME\Documents\OptiSystem 18.0 Samples\Fiber analysis and design\Multicore Fibers.
3. The example (Brillouin Fiber Laser.osd) is added to the location C:\Users\USER NAME\Documents\OptiSystem 18.0 Samples\Optical amplifiers\Fiber lasers and amplifiers
4. The example (Dynamic GPON.osd) is added to the folder C:\Users\USER NAME\Documents\OptiSystem 18.0 Samples\Metro and access systems\PON and CDMA systems
5. The example (logic gates.osd) is added to the location C:\Users\USER NAME\Documents\OptiSystem 18.0 Samples\Component sample files\Signal Processing Library\Logic
6. The example (OFDM-FSO_Using BER Analyzer.osd) is added to the location C:\Users\USER NAME\Documents\OptiSystem 18.0 Samples\Optical wireless\FSO
7. The example (Single Drive versus Dual Drive MZ Absorption-Phase Modulators.osd) is added to the location C:\Users\USER NAME\Documents\OptiSystem 18.0 Samples\Component sample files\Transmitters Library\Modulators\Optical
8. The example (Radio over Fiber WDM SCM ASK.osd) is added to the location C:\Users\USER NAME\Documents\OptiSystem 18.0 Samples\Microwave and RF optical systems
9. The example (Strain Sensing.osd) is added to the location C:\Users\USER NAME\Documents\OptiSystem 18.0 Samples\Sensor systems\FBG Sensor
10. The example (600Gbps transmission.osd) is added to the location C:\Users\USER NAME\Documents\OptiSystem 18.0 Samples\Lightwave systems\NRZ optical modulation
11. The examples (OTDR_one piece.osd) and (OTDR_two pieces.osd) are added to the location C:\Users\USER NAME\Documents\OptiSystem 18.0 Samples\Sensor systems\OTDR
12. The file (Inband pumping for extended L-band EDFA.osd) is added to the location C:\Users\USER NAME\Documents\OptiSystem 18.0 Samples\Optical amplifiers\EDFA models and analysis
13. The example (OWC component wavelength dependence.osd) is added to the location C:\Users\USER NAME\Documents\OptiSystem 18.0 Samples\Optical wireless\Earth-satellite design
14. The example (Polrization Multiplexing for Enhancing Capacity.osd) is added to the folder C:\Users\USER NAME\Documents\OptiSystem 18.0 Samples\Lightwave systems

15. The example (Optisystem Phase Modulator.osd) is added to the location C:\Users\USER NAME\Documents\OptiSystem 18.0 Samples\Component sample files\Transmitters Library\Modulators\Optical
16. The example (112Gbps DP-8PSK back to back.osd) is added to the folder C:\Users\USER NAME\Documents\OptiSystem 18.0 Samples\Advanced modulation systems\PSK systems\8PSK
17. The example (OFDM Coherent Detection Single Port Single Polarization 64QAM.osd) is added to C:\Users\USER NAME\Documents\OptiSystem 18.0 Samples\Advanced modulation systems\OFDM systems
18. The example (VLC using LED.osd) is added to the following location C:\Users\USER NAME\Documents\OptiSystem 18.0 Samples\Optical wireless\VLC
19. The example (15 Gbps FSO OFDM QAM system.osd) is added to the folder C:\Users\USER NAME\Documents\OptiSystem 18.0 Samples\Optical wireless\FSO
20. The example (Coherent Detection QPSK system.osd) in the following location C:\Users\USER NAME\Documents\OptiSystem 18.0 Samples\Advanced modulation systems\PSK systems\QPSK is updated to reflect the correct baud rate.
21. The example (Coherent Detection DP-QPSK system.osd) is updated to reflect the correct filter bandwidth. The example is located at the following link C:\Users\USER NAME\Documents\OptiSystem 18.0 Samples\Advanced modulation systems\PSK systems\QPSK
22. The example (OTDM.osd) is added to the folder C:\Users\USER NAME\Documents\OptiSystem 18.0 Samples\Lightwave systems\AM modulation
23. Move the example (White Light Source.osd) to the folder C:\Users\USER NAME\Documents\OptiSystem 18.0 Samples\Optical amplifiers\Fiber lasers and amplifiers and rename it to (FP Light Source.osd).
24. The example (Broadband white light source.osd) is added to the folder C:\Users\USER NAME\Documents\OptiSystem 18.0 Samples\Component sample files\Transmitters Library\Optical Sources.
25. The following Python examples are removed from the location C:\Users\USER NAME\Documents\OptiSystem 17.1 Samples\PythonScripts\OptiSystemSDK_Graphs due to missing support of Mayavi graphic control in current Python release.

    plot3DGraph_withMayavi_Surf_exam1.py
    plot3DGraph_withMayavi_Surf_exam2.py
    plot3DGraph_withMayavi_Surf_exam3.py

26. The example (Interchannel crosstalk at ADM in a ring network.osd) located at the following link is updated to give proper results. C:\Users\USER NAME\Documents\OptiSystem 18.0 Samples\Metro and access systems\Metro systems
27. The example (Decision Component.osd) is added to the folder C:\Users\USER NAME\Documents\OptiSystem 18.0 Samples\Component sample files\Receivers Library\Decision.