OptiSystem 17.1 Release Notes

IMPORTANT - PLEASE READ ME

Installation Notes:

- If you have an earlier major version of OptiSystem on your computer, OptiSystem 17.1 will be automatically installed in a separate directory.
- OptiSystem 17.1 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\username\Documents\OptiSystem 17.1 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 8.1/10 (**64-bit only!**)
- **Microsoft is shelving Windows 7**, we will be 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 17.1 list of updates

Components

Note: No new component is added to OptiSystem version 17.1.

Other features and improvements

Features	Changes/Updates
Save component results and selected component parameters	OptiSystem version 17.1 allows users to save results after each sweep iteration or at the end of calculation in a file for each layout. A scroll down option to choose between the two cases is available in the project layout properties popup window. Users can also save selected parameters of any component.
ResultsData directory	The “ResultsData” directory in OptiSystem Example Library is created to allow saving the results into a file (Layout 1_ExportResults.dat). If the user does not install OptiSystem Example Library, then the saved results data file is placed at the default directory “ResultsData” located at the following link: C:\Users\USER NAME\AppData\Local\Temp\
Duplicate Layout with save results selected	When duplicating a layout that has saved results into a file selected, a new file name (Layout 2_ExportResults.dat) is introduced in the new layout
EA Modulator Measured component	Users can load the EA Modulator Measured component data file (AbsorptionAlpha.dat). Users of older versions OptiSystem can load the file (AbsorptionAlpha_old loading.dat) to the component.
OWC Channel component	The parameters “Transmitter telescope gain” and “Receiver telescope gain” are used instead of the old parameters “Transmitter gain” and “Receiver gain” in the OWC Channel component to clarify their usage.
Noise bins spacing parameter	The range of the “Noise bins spacing” is changed from [1e9, 1e12 Hz] to [1Hz, 100000GHz]
FSO and OWC Channel components	The range of the FSO and OWC Channel components is changed from [0, 1e5km] to [0, 1e100km].
Electrical Amplifier component	Two separate parameters PSD and average power noise parameters are created in the Electrical Amplifier component and all other components that use PSD parameter. This is to differentiate between the two parameters.
GN-Model component	Negative NF values in the GN-Model component is allowed to let users represent real link overall NF (Negative values can be achieved when using distributed Raman amplifier in the link).The range of the NF in the GN-Model component is changed to [-100, 100].
Matlab/OptiSystem CoSimulation	Matlab software can call many OptiSystem instances and run different projects through at the same time. Check the directory Matlab calling multi-instance of OptiSystem for a new example demonstrating of this feature.
APD component	Add the received signal average power in W as a result to the APD component.
PPM Sequence Decoder component	The “Decoder symbol errors” is added as a calculation result for the PPM Sequence Decoder component. It provides the total number of symbols that have more than one 1 bit in the received sequence of bits of each symbol.

Data Recovery component	The “Delay compensation” and the “User defined decision” default settings of the “Data Recovery” component are changed to TRUE and set to 0s and 0.5 Bit, respectively.
Convert noise bins	Make the default setting of the “Convert noise bins” for all relevant components to TRUE.
Test Sets directory	The “Test Sets” directory in OptiSystem GUI is moved to the Visualizer Library to simplify the access of these visualizers.

Documentation

Document	Changes
Single Drive MZ Modulator Absorption-Phase component	The Single Drive MZ Modulator Absorption-Phase component data sheet is edited to describe the parameters “Operation mode” (Change in V2=0, Change in V1=0), the “Bias voltage1”, “Bias voltage2” and “Normalized electrical signal”. The modulating electrical signal is applied to a single port of the modulator, while the other port (V2=0) is grounded or vise versa. The bias voltages are applied to the pins of the modulator. The normalization process guarantees that the modulated signal is within limited levels.
RFSA visualizer	The field “Scale factor” of the “Graph” tap of the datasheet of the RFSA visualizer is edited to correct the scaling factor for voltage and current. It was defined in an opposite way. The power P= IV and V=IR, then P = V^2/R or P= I^2R. So, when using 50ohm the scaling factor should be -10log (50) for voltage and 10log (50) for current.
Data Recovery component	The datasheet of the Data recovery component is edited and more information on the averaging process is added to described that the averaging is done on the sequence length not the bit length. For the Center of max difference option, the amplitude of the sampled are sorted and a max difference between two successive sample is used to defined the threshold value, which is compared to the sample amplitude value at the decision instant. The default setting of the “User defined delay” is changed to TRUE and set to 0s and the default setting for the “User defined decision” is changed to TRUE and set to 0.5 Bit.
APD component	The equation of the Noise equivalent power (NEP) for the pin and APD detector components is fixed by making the term *NoiseBandwith* as $(NoiseBandwith)^{1/2}$ in the denominator. Also the process of the signal down sampling in the APD component when the “Noise bandwidth source” is set to “Use sample rate” is described.
Electrical Amplifier component	A new description to the “Noise” tab of the Electrical Amplifier component is added. When the “Add noise to signal” is set to “True”, then the noise is added to the electrical signal and the noise signal is set to zero. Thus, the Noise power reading of an electrical power meter would be -100. While, when the Noise is set to “False” then the signal and noise levels are displayed correctly on an electrical power meter.
LOS Channel component	The datasheet of the LOS Channel component is fixed to address the correct equation of Loss calculation.
Yb-Doped Fiber component	The parameter b_{eff} is defined in the overlap factor of the pump and doped fiber area (confinement factor Γ_p) of the double-clad Yb-doped fiber component as the Yb doping radius.
FSO and OWC Channel components	The FSO and OWC datasheets are updated to include the new range for the link parameter. The range is changed from [0, 1e5km] to a wider one [0, 1e100 km].
OWC Channel component	The datasheet of the OWC Channel component is edited to show the use of “Transmitter telescope gain” and “Receiver telescope gain” instead of “Transmitter gain” and “Receiver gain” to reflect the proper definition of the parameters.
OptiSystem_Tutorial_Python.pdf	The content of the file OptiSystem_Tutorial_Python.pdf is edited to show the relevant Python examples not C++ as in the older versions of OptiSystem.

Spectral Light Source, White Light Source, Electrical Amplifier, Limiting Amplifier, Noise Source components	The datasheets of theses components are edited to address the difference between the power spectral density and average power parameters.The units of PSD is changed to dBm/ Hz in these component's properties popup windows.
Decision and PAM Decision components	The equation of error vector magnitude (EVM) in the datasheets of the Decision and PAM Decision component is modified to match the correct implementation in the code.
PAM Decision component	The datasheet of the PAM Decision component is edited to show the changes made in the component properties window, where the setting of the DC Blocking and Normalize fields are set to TRUE as default. The Optimize filed is removed as it is not used in the component.
CW laser, CW Laser Measured and Directly Modulated Laser Measured components	A typo error in defining the variance of the phase noise of these components is fixed.
Optical Amplifier component	The range of the "Noise bins spacing" parameter for the Optical Amplifier component is changed to [1Hz, 100,000GHz]
OptiSPICE Output and OptiSPICE NetList components	The range for the "Delay" parameter in these components is changed to [-1e100, 1e100].

OptiSystem Version 17.1 Improvements & Fixes

Additional release notes issues

a. The "Range" for the FSO and OWC components is changed from [0, 1e5 km] to a wider one [0, 1e100 km].
b. A crash of the PPM Decoder component when the number of bits is 3 or not multiple of 2^n, which was related to zero padding is fixed.
c. Users are allowed to load (AbsorptionAlpha.dat) file to the EA Modulator Measured component. Users in older versions of OptiSystem can load the file (AbsorptionAlpha_old loading.dat) to the component.
d. OptiSystem 17.1 users can enter the number of subcarriers in the OFDM Modulator and OFDM demodulator components. Older versions of OptiSystem has the field "Number of subcarriers per port" gray.
e. A crash in the OFDM modulation component when changing the number of ports from 1 to 2 is fixed.
f. A bug in the PAM Decision component operation is fixed. The decision algorithm is edited to solve the process when choosing the settings: DC Blocking and Normalize fields. The Optimize tab is removed from the properties window as it is not used in the component. New example (4PAM direct modulation direct detection transmission link.osd) is added to demonstrate the changes
g. The Loss equation in the LOS Channel component is fixed as shown below

$$Loss = \frac{m+1}{2\,\pi\,h^2}\,Gain\cos(\theta)\,cos^m(\emptyset)$$

h. The unit for all relevant components that use power spectral density (PSD) is fixed to dBm/Hz not dBm. A new parameter is created in these components in addition to the "Power spectral density" called the "Average power" to differentiate between the two parameters
i. The examples of OptiSPICE co-simulation are edited to allow calculation in OptiSystem 17.1
j. A bug related to the generated Rayleigh scattered signal type (parameterized/sampled) in the bidirectional fiber component when both the Rayleigh and Raman Scattering options are enabled is fixed. The produced Rayleigh backscatter signal in older versions of OptiSystem is sampled and parameterized when only Rayleigh Scattering option is enabled, while the Raman effect is false.
k. A bug in setting the "Reference wavelength" in the GN-Model component when trying to change the value in nm unit is fixed.
l. The range of the delay parameter for the "OptiSPICE NetList" and "OptiSPICE Output" components is changed from [0, 1e100s] to [-1e100, 1e100s]. This parameter is used to compensate for any time variation between OptiSPICE output and the input to OptiSystem.

Examples Library

1. A new example (FBG temp sensor characterization.osd) on using FBGs as a temperature and stress sensor is added and compared with experimentally measured data.

2. An example (Experimental validation of single drive MZ modulator Absorption-Phase.osd) is added to verify the model in Single Drive MZ Modulator Absorption-Phase, where the simulation results are compared with experimentally measured data as shown in the excel file (Experimental validation of single drive MZ modulator Absorption-Phase.xlsx). The MZM datasheet (single drive MZ modulator Absorption-Phase datasheet.pdf) and Absorption-phase data file (AbsorptionPhase2.dat) are included.

3. A new example (4PAM direct modulation direct detection transmission link.osd) that demonstrates the transmission and detection of 4-bits PPM modulated signal is created.

4. New example (chirped pulse effect on transmission.osd) is created to show the effect of chirping the pulses on the transmission.

5. New examples (Continuum generation_Soliton in DSF_40dBm.osd and Continuum generation_CW laser in SMF_40dBm.osd) on continuum generation are added to OptiSystems.

6. The effect of setting the Noise dynamic of the CW laser on the noise bins is shown in the newly added example (CW laser Noise dynamic effect on noise bins.osd).

7. The effect of EDFA NF on the noise bins is described in the example (Amplifier NF effect on noise bins.osd).

8. A new example on creating CW light using ring configuration and FBGs is described in (CW Ring laser using FBGs.osd).
9. The example (Free Space Link - Earth to Satellite.osd) is updated by adding a BERT test set to allow monitoring of the bit errors.
10. The example (4 PAM - VCSEL MMF Fiber Link using PAM Decision Component.osd) is updated by adding a BERT test set to allow monitoring of the bit errors.
11. A new example (Comb generation_Optoelectronic scheme.osd) is added to demonstrate creating optical combs using MZM.
12. A new example (Photonic Radar with balanced iQ.osd) is created to demonstrate optical radar applications.
13. Dual-polarization MZM is demonstrated in the example (DPMZM.osd).
14. An optical XOR gate using nonlinearity in SAO is demonstrated in the example (XOR-gate.osd).
15. The effect of pulses chirp factor on the transmission is demonstrated in the example (chirped pulse effect on transmission.osd).
16. Third-order intermodulation in MMF is created in the example (3rd order intermodulation in MMF.osd).
17. RoF transmission example (ROF_carrier suppression.osd) for ASK signal using carrier suppression is created.
18. The description of the operation of the different polarization controller components in OptiSystem are discussed in the example (Operation of polarization control components.osd).
19. The noise bins of the DML when the RIN is selected are compared to the CW laser noise bins in the example (Noise Bins comparison for DML and CW Laser.osd).
20. Edit the example (inter satelite Design.osd) to allow characterizing the system using the BER, SER and EVM metrics.
21. A new example (Dual Port MZ Modulator Measured.osd) for dual-port MZM is added to the example library.
22. A new example (DWDM transmission using Er-Yb-doped waveguide amplifier.osd) for DWDM transmission using Er-Yb doped waveguide is added to the example library.
23. A new example (Electroabsorption Modulator Measured input file verification_old loading data file.osd) for using Electroabsorption Modulator Measured with old AbsorptionAlpha data (AbsorptionAlpha_old loading.dat) is created. The data file has three columns only. The data file has the default data stored in the code. The default data are used in the component if there is no file loaded with correct structure. Older versions of OptiSystem requires three columns data file, while version 17.1 requires four columns (AbsorptionAlpha_version 17.1.dat).
24. A new subdirectory (Matlab calling multi-instance of OptiSystem) is added to the example library to show the capability of Matlab calling multi-instances of OptiSystem projects.

Calculating the Matlab project will call first the project (Matlab Call OptiSystem.osd) then calls the project (Matlab Call OptiSystem1.osd).

25. A new example (SCM 6bits-QAM Electrical.osd) for single carrier modulation(SCM) mQAM electrical transmission is added. The number of bits per symbol can be changed in the example.
26. New example (CWDM CW Lasers amplification using SOA.osd) demonstrating the amplification of CWDM channels using semiconductor optical amplifier is added.
27. A new FSO QAM OFDM transmission system example (FSO OFDM QAM system.osd) is created.
28. New example (PDM-QAM_OFDM FSO.osd) on polarization division multiplexing in QAM-OFDM free space optics transmission system is added.