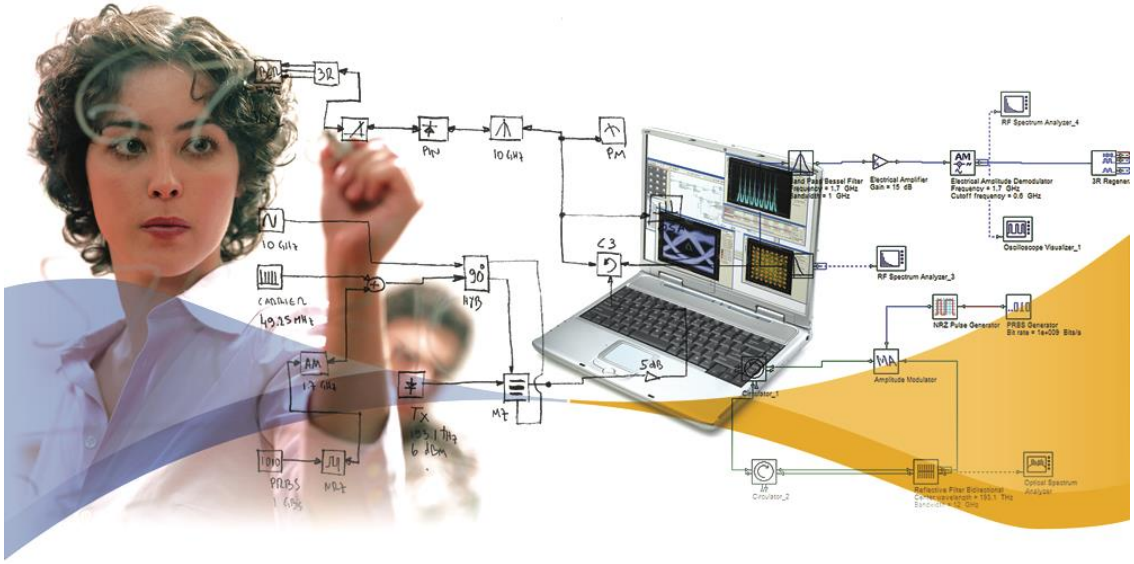


OptiSystem-MATLAB data formats

(Version 1.0)

7 Capella Court
Nepean, ON, Canada
K2E 7X1

+1 (613) 224-4700
www.optiwave.com

Optical signal data format (1)

Signal type	Data elements	Comments
Sampled	***InputPort1.Sampled.Signal***	Represents the complex envelope of the optical signal (real/imag) – *1xn complex double* If there are two polarization states, two rows will be created (*2xn complex double*)
	InputPort1.Sampled.Time ***Inputport1.Sampled.Frequency***	The time/frequency sampling points for the sampled optical signal (s or Hz) • If the parameter **Sampled signal domain** = "Time", use ***InputPort1.Sampled.Time*** • If the parameter **Sampled signal domain** = "Frequency", use ***InputPort1.Sampled.Frequency***
	InputPort1.Sampled.CentralFrequency	The center frequency (Hz) of the optical signal
Sampled (Channels)	***InputPort1.Channels***	List of wavelength channels entering specified port • To access data for a sampled signal (Channel A), use ***InputPort1.Sampled(A).Signal***, etc. • To access data for a parameterized signal (Channel A), use ***InputPort1.Parameterized.Power(A)***, etc.
Sampled (Spatial)	***InputPort1.Sampled.Spatial.ModeX.Amplitude***	Real or complex amplitude of spatial mode(s) – *nxn array* Note 1: To access Y polarization data, use ***ModeY*** in lieu of ***ModeX*** Note 2: If more then one mode is present, separate sampled signals will be created for each mode and can be accessed as follows (for Mode A): ***InputPort1.Sampled(A).Spatial.ModeX.Amplitude***
	InputPort1.Sampled.Spatial.ModeX.Properties	String value (describes mode type and index)
	InputPort1.Sampled.Spatial.ModeX.DeltaSpaceX ***InputPort1.Sampled.Spatial.ModeX.DeltaFrequencyX***	X-polarization: Discretization in space (m) or discretization in frequency (1/m)
	InputPort1.Sampled.Spatial.ModeX.DeltaSpaceY ***InputPort1.Sampled.Spatial.ModeX.DeltaFrequencyY***	Y-polarization: Discretization in space (m) or discretization in frequency (1/m)
Parameterized	***InputPort1.Parameterized.Power***	Average power of parameterized optical signal (W)
	InputPort1.Parameterized.Frequency	Central frequency of parameterized optical signal
	InputPort1.Parameterized.SplittingRatio	Polarization splitting ratio of parameterized optical signal
	InputPort1.Parameterized.Phase	Phase of parameterized optical signal

Optical signal data format (2)

Signal type	Data elements	Comments
Noise	***InputPort1.Noise.Power***	Average power of each noise bin (W)
	InputPort1.Noise.LowerFrequency;	Lower frequency range of each noise bin (Hz)
	InputPort1.Noise.UpperFrequency;	Upper frequency range of each noise bin (Hz)
	InputPort1.Noise.Phase	Phase of each noise bin (Hz)
Individual sample	***InputPort1.IndividualSample***	Represents the complex amplitude of the optical signal for a single sampling point

Electrical & Binary/M-ary data formats

Electrical

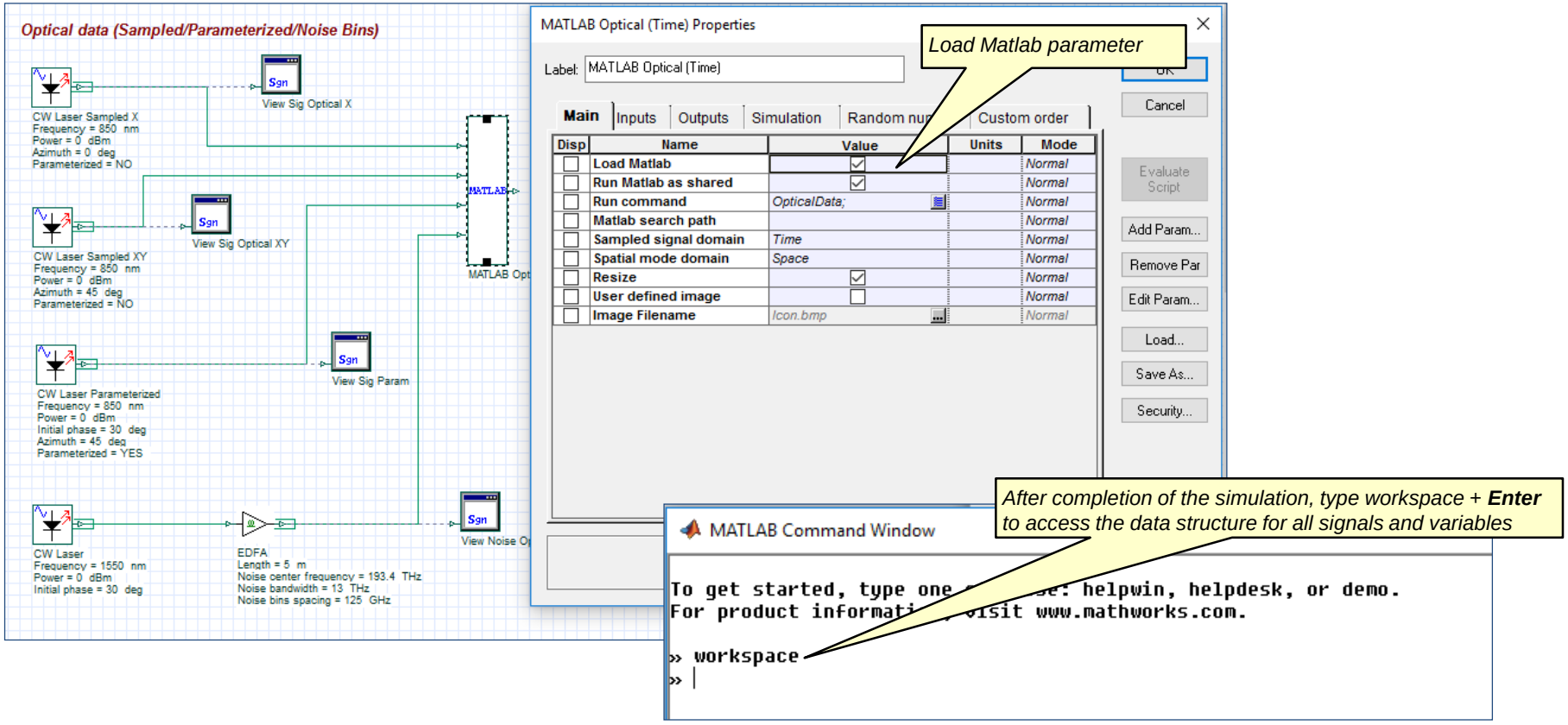
Signal type	Data elements	Comments
Sampled	***InputPort1.Sampled.Signal***	Represents the electrical signal sampled waveform (real/imag) – *1xn complex double*
	InputPort1.Sampled.Time ***Inputport1.Sampled.Frequency***	The time/frequency sampling points for the sampled electrical signal (s or Hz) • If the parameter **Sampled signal domain** = "Time", use ***InputPort1.Sampled.Time*** • If the parameter **Sampled signal domain** = "Frequency", use ***InputPort1.Sampled.Frequency***
Noise	***InputPort1.Noise.Signal***	Represents the electrical noise sampled waveform (real/imag) – *1xn complex double* Note: If the noise is combined with the sampled signal (before the MATLAB Component) these arrays will be empty (zero values)
	InputPort1.Noise.Time ***Inputport1.Noise.Frequency***	The time/frequency sampling points for the sampled electrical noise (s or Hz) • If the parameter **Sampled signal domain** = "Time", use ***InputPort1.Noise.Time*** • If the parameter **Sampled signal domain** = "Frequency", use ***InputPort1.Noise.Frequency***
Individual sample	***InputPort1.IndividualSample***	Represents the amplitude of the electrical and noise signal for a single sampling point

Binary & M-ary

Signal type	Data elements	Comments
Binary	***InputPort1.Sequence***	Represents the sequence of binary bits (0's and 1's)
	InputPort1.BitRate	Bit rate of binary sequence (1/s)
M-ary	***InputPort1.Sequence***	Represents the sequence of M-ary symbols – *1xn double*
	InputPort1.BitRate	Sample rate of M-ary sequence (1/s)

Accessing the MATLAB workspace

1. The data structure for all input and output ports and all variables declared within the MATLAB m-file can be viewed from the MATLAB workspace
2. To access the workspace, first select **Load MATLAB** from the ***MATLAB Component*** and select OK. This action pre-loads MATLAB (it will stay open unless it is manually closed)
3. After running a simulation, open the MATLAB Command Window and type “workspace”.



MATLAB m-file associated with *Optical_Data.osd*

The data structure of any input port can be equated to any output port as long as they are the same type (optical, electrical, m-ary, binary)

Ports are accessed using the nomenclature InputPort1, InputPort2, etc.

Variables on left are local to the MATLAB workspace.

OpticalData.m

```
OutputPort1 = InputPort1;

%SAMPLED SIGNAL (InputPort1.Sampled; InputPort2.Sampled)
%-------------------------------------------------------------------------

%Signal with 1 polarization state (default) - InputPort1
OpticalSignal_Envelope = InputPort1.Sampled.Signal; %Complex envelope of the optical signal (real/imag amplitudes)
OpticalSignal_Time = InputPort1.Sampled.Time; %Sampled time array (s)
OpticalSignal_CtrFreq_S = InputPort1.Sampled.CentralFrequency; %Central frequency of the optical signal (Hz)

%Signal with 2 polarization states - InputPort2

OpticalSignal_Envelope_XY = InputPort2.Sampled.Signal; %Complex envelope of the optical signal (X data in 1st row ;
OpticalSignal_Time_XY = InputPort2.Sampled.Time; %Sampled time array
OpticalSignal_CtrFreq_XY = InputPort2.Sampled.CentralFrequency; %Central frequency of the optical signal

%OPTICAL PARAMETERIZED SIGNAL (InputPort3.Parameterized)
%-------------------------------------------------------------------------

%Parameterized signal
OpticalSignal_Pwr = InputPort3.Parameterized.Power; %Average power of parameterized optical signal (W)
OpticalSignal_CtrFreq_P = InputPort3.Parameterized.Frequency; %Central frequency of parameterized optical signal
OpticalSignal_SR = InputPort3.Parameterized.SplittingRatio; %Polarization splitting ratio of parameterized optical s
OpticalSignal_Ph = InputPort3.Parameterized.Phase; %Absolute phase of parameterized optical signal

%NOISE BINS (InputPort4.Noise)
%-------------------------------------------------------------------------

NoiseArray_Pwr = InputPort4.Noise.Power; %Average power of each noise bin (W)
NoiseArrayLowFreq = InputPort4.Noise.LowerFrequency; %Lower frequency range of each noise bin (Hz)
NoiseArrayHighFreq = InputPort4.Noise.UpperFrequency; %Upper frequency range of each noise bin (Hz)
NoiseArrayPhase = InputPort4.Noise.Phase; %Phase of each noise bin (rad)
```

Example of workspace for *Optical_Data.osd*

To view further details on a data structure, double left click on any variable to open up the Variables window