



Introduction to HyperLynx SI/PI scripting

Functionality of various icons which appear in the HyperLynx SI/PI application GUI can be achieved using automation. This document is a guide to create and simulate schematics, which can be done manually, using scripting.








Creating a new blank schematic in LineSim


- New LineSim Free-form Schematic 
Dim App: Set App = Application
Dim Schem: Set Schem = App.NewSchematic

Opening a schematic in LineSim

- Open LineSim Schematic 
App.OpenFile("C:\MentorGraphics\9.1HL\SDD_HOME\hyperlynx\HypFiles\demodiff.hyp")

Adding components to a schematic in LineSim

- Add IC I/O buffer to Schematic 
Dim Buffer: Set Buffer = Schem.AddObject(hlScmObjTypeIc)
- AddDifferential IC I/O buffer to Schematic 
Dim diffBuffer: Set diffBuffer = Schem.AddObject(hlScmObjTypeDiffIc)
- Add transmission line to schematic 
Dim Tline: Set Tline = Schem.AddObject(hlScmObjTypeTline)
- Add resistor to schematic 
Dim res: Set res = Schem.AddObject(hlScmObjTypeResistor)
- Add capacitor to schematic 
Dim cap: Set cap = Schem.AddObject(hlScmObjTypeCapacitor)
- Add inductor to schematic 
Dim ind: Set ind = Schem.AddObject(hlScmObjTypeInductance)
- Add ferrite bead to schematic 
Dim fBead: Set fBead = Schem.AddObject(hlScmObjTypeFerrBead)

- Add connection to pull-up/down voltage 


Dim pullVolt: Set pullVolt = Schem.AddObject(hlScmObjTypeVoltage)

- Add connection to ground 

Dim gnd: Set gnd = Schem.AddObject(hlScmObjTypeGround)

- Add S-Parameter/SPICE Model to schematic 

Dim bbox: Set bbox = Schem.AddObject(hlScmObjTypeBlackBox)

- Add Via to schematic 

Dim via: Set via = Schem.AddObject(hlScmObjTypeVia)

- Add Differential Via to schematic 


Dim diffVia: Set diffVia = Schem.AddObject(hlScmObjTypeDiffVia)

- Add series MOSFET to schematic 

Dim FETtrans: Set FETtrans = Schem.AddObject(hlScmObjTypeMosfet)

- Add S-Parameter Port schematic 

Dim port: Set port = Schem.AddObject(hlScmObjTypeEntry)

- Add text comment 

Dim txtComment: Set txtComment = Schem.AddObject(hlScmObjTypeComment)

Assigning values to component parameters

- IC Buffer parameters

- AssignModel

Assigns desired model to the device.

Result = Buffer.AssignModel(1, "demo1.ibs", "COMP1", "1")

- Rename

Assigns new reference designator and pin names to the object

Result = Buffer.Rename "UDRV", "OUT+", "OUT-"

➤ Transmission line parameters

- LineType

Specifies simulation-related parameters of transmission line using hTlineTypeUser

Tline.LineType= hTlineTypeUser

Calculates simulation-related parameters based on PCB stackup data using hTlineTypeAuto

Tline.LineType= hTlineTypeAuto

- Transmission line impedance, in Ohms (read-write only when LineType is hTlineTypeUser)

Tline.Z0 = 50

- Transmission line delay, in seconds (read-write only when LineType is hTlineTypeUser)

Tline.Delay = 1e-9

- Transmission line DC resistance, in Ohms (read-write only when LineType is hTlineTypeUser)

Tline.R = 0.001

- Transmission line length, in meters (when LineType is hTlineTypeAuto)

Tline.Length = 0.002

- Transmission line width, in meters (when LineType is hTlineTypeAuto)

Tline.Width = 2.5e-4

➤ Passive component parameters – Resistor, capacitor and inductor

- Value (Ohm for resistance, F for capacitance and H for inductance)

res.Value = 100

cap.Value=1e-6

ind.Value=1e-9

- AssignModel (specified by file or device)

Result is TRUE if model assignment is successful and FALSE if it is not

Result = res.AssignModel("resistor.ibs", "resistor")

Result = cap.AssignModel("capacitor.ibs", "capacitor")

Result = ind.AssignModel("inductor.ibs", "inductor")

➤ S-Parameter/SPICE model parameters

- AssignModel (only for SPICE models)

Result = bbox.AssignModel("fast_rcv.sp", "Fast_Rcv", "")

Connecting, Disconnecting and Deleting components

- Connect
Connects specified ports of specified objects with wires
Returns TRUE if connection is made, FALSE otherwise

Result = Schem.Connect(Res, 2, Cap, 1)
- Disconnect
Disconnects specified ports of specified objects

Schem.Disconnect res, 1
- Delete
Deletes specified object or connection

Schem.Delete res

Placing the components in schematic

- AutoPlace
Places elements automatically

Schematic.AutoPlace
- SetCoord
Places components based on specified coordinates

res.SetCoord 100, 200

Saving schematic

Saves schematic using specified file name

Schem.Save "c:\schematics\myschematic.ffe"

Running simulation

- Performing simulation

Dim Simulator: Set Simulator = App.Simulator
Simulator.Run
- Changing simulation parameters
 - Type
Different simulator types are:

hlSimTypeAuto - Automatically chooses the best simulator
Simulator.Type = hlSimTypeADMS

hlSimTypeHyperSim - HyperLynx native simulation
Simulator.Type = hlSimTypeHyperSim

hISimTypeADMS - ELDO/ADMS simulation
Simulator.Type = hISimTypeADMS

hISimTypeHSPICE - HSPICE simulation
Simulator.Type = hISimTypeHSPICE

- Step
Sets step time (resolution) manually

Simulator.StepAuto = False (when simulation step needs to assigned manually)
Simulator.Step = 1e-11

- StopTime
Sets stop time manually

Simulator.StopAuto = False
Simulator.StopTime = 10e-9

- BitSequenceType
Bit Sequence specification for simulation

hlBitSequenceEdge – Rising or Falling edge
hlBitSequenceOscillator – Oscillator

Stimulus.BitSequenceType = hlBitSequenceOscillator

- EdgelsRising
Assign rising edge signal

Stimulus.EdgelsRising = TRUE

- Frequency

Stimulus.Frequency = 133e6

Obtaining simulation results

Contains and shows simulation results

Set Result = Simulator.Result

Result.Show

S-Parameter model

- Extracting S-parameter model
Performs extraction and saves Touchstone model using specified FileName

Set Xtractor = Application.SParamExtractor
Xtractor.Extract("c:\models\channel.s4p")

- Changing model parameters
 - Frequency settings

Changes minimum frequency, maximum frequency and sweep type (linear, Logarithmic and Adaptive)

Xtractor.MinFreq = 1e6

Xtractor.MaxFreq = 5e9

Xtractor.FreqSweepType = hlFreqSweepLinear

Changes number of frequency points

Xtractor.StepCount = 1000 (when frequency sweep type is Linear)

Xtractor.StepPerDecade = 200 (when frequency sweep type is Logarithmic)

- ReflImpedance

Assigns reference impedance of load connected to Touchstone model ports, in Ohms

Xtractor.ReflImpedance = 0.01