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Encrypted HSPICE Simulation

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About Encrypted HSPICE Simulation

Note
We recommend that you do not use the Encrypted HSPICE flow described below. Instead, use the native HSPICE support available in ADS.

The Encrypted HSPICE flow has many limitations. It involves extensive setup, and does not support many features such as EM cosimulation, Ptolemy cosimulation, and others. Starting with ADS 2008, the ADS simulator can read native HSPICE netlists directly. This new flow, called HSPICE Compatibility, is highly superior and does not have any of the limitations of the Encrypted HSPICE flow. To use HSPICE Compatibility, request that your vendor supply you with HSPICE netlists that are encrypted using the ADS RF IP Encoder, and use them for your ADS simulations.

For more information, see *HSPICE Compatibility* (hspice) and *RF Intellectual Property Encoder* (rfipenc).

This documentation describes the Encrypted HSPICE Transient simulation controller (*HS_Tran*). It provides details about using the controller and describes its parameters. For complete information about using the *HS_Tran* controller within the encrypted HSPICE flow, see the *Encrypted HSPICE Flow* (hspicecosim) documentation.

The *HS_Tran* controller is used to perform a transient analysis only when a network contains encrypted HSPICE models. The controller creates a frequency-domain model for the unencrypted portion of the network. The HSPICE transient analysis performs the transient analysis on the complete network.

Using the HSPICE Transient Controller

Note
We recommend that you do not use the Encrypted HSPICE flow described below. Instead, use the native HSPICE support available in ADS.

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For more information, see *HSPICE Compatibility* (hspice) and *RF Intellectual Property Encoder* (rfipenc).

The *HS_Tran* controller is available on the Analog/RF Schematic's *Signal Integrity-Verification* component palette. When using the *HS_Tran* controller, other controllers such as DC or AC cannot be present in the design. Also, no DSP cosimulation is allowed such as an ADS Ptolemy cosimulation. If an additional controller is present, the simulator will terminate the simulation with an error message.

The unencrypted portion of the design can contain only linear devices, and selected voltage and current sources. The following table lists the allowed sources.

Sources allowed for encrypted HSPICE Transient Simulation

Component	Description
The allowed voltage sources are:	
V_DC	DC
VtStep	Step
VtPulse	Pulse
VtPWL	Piecewise Linear
VtExp	Exponential Decay
VtSine	Decaying Sine Wave
VtSFFM	Single Frequency FM
VtBitSeq	Bit Sequence
VtImpulse	Impulse
VTLFSR	LFSR
The allowed current sources are:	
I_DC	DC
ItStep	Step
ItPulse	Pulse
ItPWL	Piecewise Linear
ItExp	Exponential Decay
ItSine	Sine

HSPICE Transient Simulation Parameters

Note
We recommend that you do not use the Encrypted HSPICE flow described below. Instead, use the native HSPICE support available in ADS.

The Encrypted HSPICE flow has many limitations. It involves extensive setup, and does not support many features such as EM cosimulation, Ptolemy cosimulation, and others. Starting with ADS 2008, the ADS simulator can read native HSPICE netlists directly. This new flow, called HSPICE Compatibility, is highly superior and does not have any of the limitations of the Encrypted HSPICE flow. To use HSPICE Compatibility, request that your vendor supply you with HSPICE netlists that are encrypted using the ADS RF IP Encoder, and use them for your ADS simulations.

For more information, see *HSPICE Compatibility* (hspice) and *RF Intellectual Property Encoder* (rfipenc).

ADS provides access to HSPICE Transient simulation parameters enabling you to define aspects of the simulation listed in the following table:

Tab Name	Description	For details, see...
Freq/Time Setup	Sets parameters related to time and frequency.	Defining the Frequency and Time Setup
Options	Sets parameters to check model passivity, and defines HSPICE options used in the HSPICE analysis context.	Setting Up Optional Parameters
Output	Selectively save simulation data to a dataset.	Saving Output Data For details about setting Output parameters, see *Selectively Saving and Controlling Simulation Data* (cktsim).
Display	Control the visibility of simulation parameters on the schematic.	For details, see *Displaying Simulation Parameters on the Schematic* (cktsim).

Note
To specify the temperature, place an ADS *Options* component on the schematic. The *Options* component is available on any of the analog/RF simulation palettes, such as *Simulation-AC* and *Simulation-Transient*. This temperature setting will apply to both of the ADS and HSPICE simulations. For details about the *Options* component, see *Using the Simulator Options Component* (cktsim).

Defining the Frequency and Time Setup

Following is information on the parameters related to time and frequency. The following table describes the parameter details. Names listed in the *Parameter Name* column are used in netlists and on schematics.

Setup Dialog Name	Parameter Name	Description
Frequency Setup		Together, *FreqStep* and *FreqStop* set the range of frequencies used to characterize the unencrypted network in the frequency domain which will be used by the convolution engine. If the simulator finds a transient source with a higher bandwidth, then the simulator will adjust the user-specified frequency range to the higher frequency. Specifying a better frequency resolution and a higher frequency range may result in better accuracy, but will also result in more simulation time.
Frequency step	FreqStep	
Frequency stop	FreqStop	
Time Setup		Together, *TimeStep* and *TimeStop* set the time range over which the transient analysis is performed.
Time step	TimeStep	
Time stop	TimeStop	

Setting Up Optional Parameters

Following is information on setting up the optional parameters for the HSPICE Transient simulation. The following table describes the parameter details. Names listed in the *Parameter Name* column are used in netlists and on schematics.

HSPICE Transient Simulation Options

Setup Dialog Name	Parameter Name	Description
Enforce Passivity	EnforcePassivity	When this option is selected, the controller determines if the frequency model is passive. If it finds that the data is not passive, the simulator will adjust the frequency model such that passivity is ensured.
HSPICE Options		For details about the HSPICE simulator's Global Parameters and Options, see the *hspice.pdf* documentation provided with the simulator.
Global Parameters		Use this entry to specify the Global Parameters that will be used within the HSPICE analysis context. The entries are names that are associated with numeric values. The equivalent HSPICE netlist output is: .PARAM <name> = <value>
Name	GlobalParamName	
Value	GlobalParamValue	
Options		Use this entry to specify the Options that will be used within the HSPICE simulator. The entries are names that are associated with numeric values, or names only if no numeric value is required. The equivalent HSPICE netlist output is: .OPTION <name> = <value> (when a value is specified) .OPTION <name> (when a value is not specified)
Name	OptionName	
Value	OptionValue	

Saving Output Data

The parameters on the Output tab work the same as for all other analog/RF analysis controllers to create an Output Plan, which controls the data that will be saved to the dataset. Although the parameter *Save by hierarchy: Node Voltages* is selected by default

for the *Transient* simulation controller, this parameter is left unselected for the *HS_Tran* controller to improve simulation speed. For details about setting Output parameters, see *Selectively Saving and Controlling Simulation Data* (cktsim).