Subject: Using an ADS channel impulse response in SerDesDesign.com tools

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This paper discusses features on the web site: https://www.serdesdesign.com

A SerDes system for a single channel has the typical structure shown in this figure.



See details in About the SerDes System Single Channel Tool...

This document discusses modeling the total channel by importing an impulse response from another tool. The Keysight ADS Channel Simulator is discussed.

Channel Impulse Background

All channel simulators (CS) based on the IBIS standard are able to model SerDes systems as shown in the above figure. Oftentimes, parts of the channel are defined using S-parameters. Necessarily, S-parameters are defined with an upper frequency maximum. Per the IBIS definition the total channel includes all content between the output of the Tx behavioral (AMI) model and Rx behavioral (AMI) model. This includes the Tx IBIS Buffer, Tx Pkg, Channel, Rx Pkg and Rx IBIS Buffer.

As part of their simulation process, all channel simulators must convert the total channel into an equivalent (or near equivalent) single ended time domain impulse response.

Fortunately, such an impulse response from another CS tool can be imported into the SerDesDesign.com CS tools.

Exporting and Using an ADS Impulse Response File

Before an ADS channel simulation is run, go to the ChannelSim controller and set 'Status Level' = 4. Then after the simulation is run, the files named imp_<tx/rx>_init_<in/out>.txt will be written to the ADS project data directory. These files contain the single ended total channel impulse response at the Tx/Rx input/output ports. The file imp_rx_init_out.txt is the one of interest here. It contains the total channel impulse response. It has two columns. The first column is time. The second is the impulse response value.

To use the ADS imp_rx_init_out.txt file in the SerDesDesign tools, the file needs to be modified. Replace the space separator between the two columns with a comma separator. Replace any time symbol (nsec, psec, etc.) with its exponential notation (e-009, e-012, etc.). Then the file needs to be renamed with the 'csv' file extension instead of the '.txt' extension. Open the '.csv. file in Excel and make sure columns 1 and 2 look proper. Specifically, the time column should have values that are monotonically increasing with constant time step in each consecutive time value. Make sure there are no duplicate time stamps. This now is a proper impulse file for use in the SerDesDesign tools to represent the total SerDes system channel as defined by the ADS channel simulator tool.

Conclusion

This document discusses using a channel impulse response in SerDesDesgin.com tools where the impulse response came from another tool. The process for exporting an impulse response file from the Keysight ADS Channel Simulator and using that impulse file in SerDesDesign.com tools.

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