# Subject:  Channel Impulse Model

## Author:  John Baprawski; John Baprawski Inc. (JB)

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

The total channel is represented by its equivalent single ended impulse response.

This figure shows a typical SerDes system block diagram to be simulated using a channel simulator. The total channel shown in this figure, and as defined by the IBIS standard, is considered to be linear and time invariant (LTI).
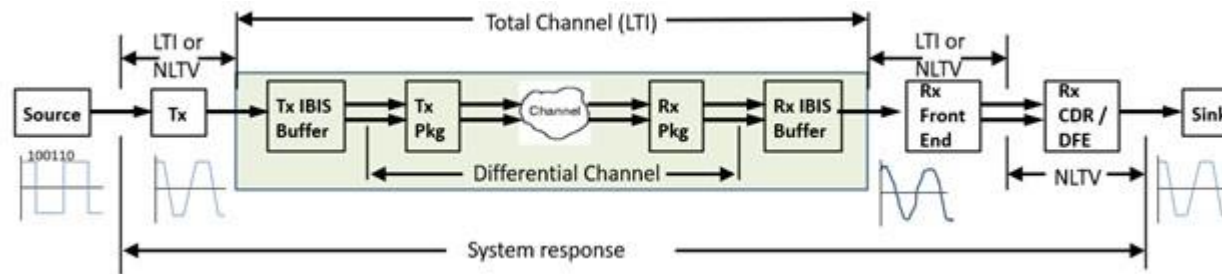


## Parameters

| Name | Description | Entry Value(s) | Type | Limits | Comments |
|---|---|---|---|---|---|
| ImpulseFile | ImpulseDataFile | ChannelTest_ref_ 32spb.h21dd.csv | File | | Upload a file (Implulse file format) or list previously uploaded file. |
| EnableChAntiAliasing | Enable channel impulse anti-aliasing filter | 0 | Integer | [0, 1] | 0 = No; 1 = Yes |

| ChAntiAliasingFc | Channel anti-aliasing filter corner frequency | 0 | Real | >= SymbolRate | Value in Hz; Used only when EnableChAntiAliasing=1. |
|---|---|---|---|---|---|

## Additional Notes/Equations

- Windows:  The user's channel directory is:  C:\SerDesDesign\user-<xxx>\files\channel_data; where <xxx> is the assigned user number.
- The values SymbolRate and SamplesPerSymbol are defined in the 'Setup Analysis' section.
- ImpusleFile with *.csv (comma separated variables) format with two columns.  First column is for time (with constant time step) and second column is for impulse value.  The time column must have constant time steps starting at zero and with tstep = 1/SymbolRate/SamplesPerSymbol.
  - Upload this file into the user's channel directory.
- An impulse file can be exported from most Channel Simulators.
  - From the Keysight Advanced Design System (ADS) tool, such an impulse file exported from the ADS channel simulator is typically named init_rx_init_out.txt.   See detail at this link:  **Using an ADS Impulse Response**.
  - Linux:  For the SerDesDesign.com web-based Linux channel simulator (**SerDes System Tool**), it can be downloaded in the section for 'Download Channel Data Files'.
- Using EnableChAntiAliasing and ChAntiAliasingFc:
  - Channel impulse responses obtained from the SerDesDesign.com tools do not have any high frequency aliasing and use of these two parameters is not needed.
  - When the impulse file is obtained from another Channel Simulator (other than SerDesDesign.com tools) and when the channel is composed of S-parameter files, the impulse file can often include unwanted high frequency aliasing.  When this is the case, one can eliminate the high frequency aliasing by setting EnableChAntiAliasing=1 and ChAntiAliasingFc to the minimum maximum of the highest frequency in the S-parameter files.  For example, if 2 S-parameter files were used in the channel by the other Channel Simulator with maximum frequencies 30 GHz and 40 GHz respectively, then 30 GHz is the minimum maximum frequency.
  - The use of these parameters are explained in the document **A_Better_AnitAliasing_Process.**
- Reuse of the impulse file from a channel simulation that uses IBIS sections and/or S-parameter files, eliminates the need to recalculate the impulse from the defined channel.
- The impulse file also be obtained or used in other web based SerDesDesign.com Linux tools:  **SerDes System Tool, Repeater Tool or Optical E-O-E Repeater Tool.**

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