Examples for the [AMI Test Configuration] Keyword

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Revisions

- Rev. 1.0 – Initial Release (shown at IBIS-ATM Dec. 12, 2023)
- Rev. 1.1 – Minor revisions (Dec. 13, 2023)
- Rev. 2.0 – increased number of bits in time domain simulations to avoid making total number of bits and wave_size coincidentally the same (Jan. 18, 2024)

Concept

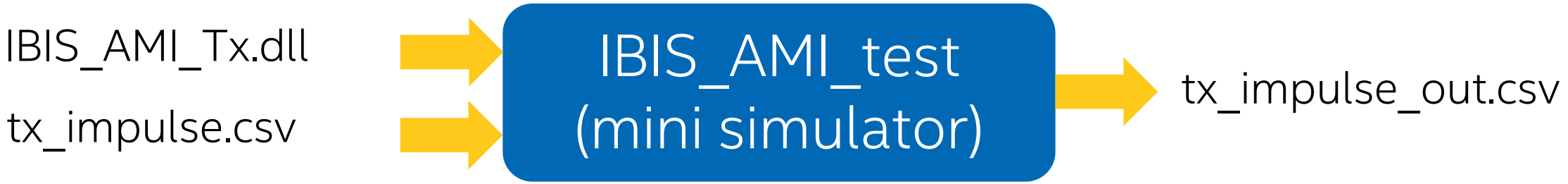
- SiSoft provided an IBIS-AMI TX test model set in 2008/2009
  - Included a streamlined simulator and source code for AMI_Init, AMI_GetWave, AMI_Close with equalization
  - SiSoft IBIS-AMI Eval Toolkit v2.21 - September 30, 2009

This set already provides parameters, impulse responses (before and after EQ), and bitstream input and output for the given IBIS-AMI model

We can re-format this data manually according to the [AMI Test Configuration] requirements in BIRD 229 as examples

Procedure – Statistical

- IBIS_AMI_test -f IBIS_AMI_Tx.dll -i tx_impulse.csv



- The CSV files contain both parameters (.ami and simulation controls) and impulse response waveforms

Editing the tx_impulse_out.csv delivers the IR and parameter output files for Statistical; tx_impulse.csv provides the IR and parameter input files

Procedure – Time-Domain

- IBIS_AMI_test.exe -f IBIS_AMI_Tx.dll -i tx_impulse.csv -g -c > waveform_rx_pad.csv

- The CSV files contain both parameters (.ami and simulation controls) and impulse response waveforms

Editing the tx_impulse_out.csv delivers the IR and parameter output for Statistical; tx_impulse.csv provides the IR and parameter inputs

Extra Step – PRBS Pattern

- IBIS_AMI_prbs.exe -f tx_impulse.csv

- The input CSV file contains the PRBS shift-register size (here 22)

Editing the prbs_in.csv down to the voltage column delivers the bitstream input file for Time_Domain

Example IBIS [Model] Text Excerpt (1 of 2)

[Model] IBIS_AMI_Tx

Model_type Output

...

[Algorithmic Model]

Executable Windows_VisualStudio_64 IBIS_AMI_Tx_64.dll IBIS_AMI_Tx.ami

Executable Windows_VisualStudio_32 IBIS_AMI_Tx.dll IBIS_AMI_Tx.ami

Executable linux_gcc3.2.3_32 libIBIS_AMI_Tx.so IBIS_AMI_Tx.ami

[AMI Test Configuration] Typ_corner_statistical

Type Statistical

Direction Tx

Input_IR_file four_tap_input_IR.txt

AMI_input_parameters_file four_tap_tx_params_typ_stat.txt

Golden_IR_file four_tap_output_IR_typ.txt

AMI_output_parameters_file four_tap_output_params_typ_stat.txt

Executable_index 2

Modified from the sisoft_tx.ibs file

Example IBIS [Model] Text Excerpt (2 of 2)

[AMI Test Configuration] Typ_corner_time_domain
Type Time_domain
Direction Tx
Input_IR_file four_tap_input_IR.txt
Input_waveform_file four_tap_input_bits.txt
AMI_input_parameters_file four_tap_tx_params_typ_TD.txt
Golden_IR_file four_tap_output_IR_typ.txt
Golden_waveform_file four_tap_output_wave_typ_TD.txt
AMI_output_parameters_file four_tap_output_params_typ_TD.txt
Executable_index 2

[End Algorithmic Model]

Modified from the sisoft_tx.ibs file

Changes in V2 – Extended TD to 2000 Bits

- Only three files have been updated
  - four_tap_input_bits.txt
    - This is the AMI_GetWave input bitstream
    - Size has approximately doubled to 2000 bits (16000 lines or samples)
  - four_tap_output_params_typ_TD.txt
    - This is the AMI_Parameters_Out string report for time domain simulations
    - Size has doubled from 8 to 16 blocks, but the content of each remains the same
  - four_tap_output_wave_typ_TD.txt
    - This is the AMI_GetWave output voltage vector
    - Size has approximately doubled to cover 2000 bits (16000 lines or samples)

Basic Configuration Used to Generate Files

Parameter	Value	Evaluation Toolkit	BIRD 229 Example	Comment
Samples (wave_size or row_size):	1024	Explicit (row_size)	Explicit (Number_of_rows)	For both impulse responses
Samples/bit	8	Calculated	Calculated	Not a parameter
Bit time	200 ps	Explicit (bit_time)	Explicit (Symbol_time)	
Total bits in impulse responses (block size in UI)	128	Calculated	Calculated	Not a parameter
Sample interval	25 ps	Explicit (sample_interval)	Explicit (Sample_interval)	
Total waveform duration	400 ns	Explicit (stop_time)	Implied from file length	
Total number of TD bits	2000	Calculated	Calculated	Not a parameter

Issues and Bugs

- The IBIS_AMI_Tx DLL supplied only supports 32-bit Microsoft* Windows
  - Recompilation is needed for 64-bit systems
- The IBIS_AMI_Test executable supplied only supports 32-bit Microsoft* Windows
  - Source code was promised to the IBIS Open Forum…?
- [Ramp] keyword in original violates ibischk7 –caution matching rules
  - Easily fixed manually
- IBIS_AMI_Tx DLL puts a “Usage In” parameter, *tx_swing*, on the parameter output
  - This could be corrected as part of the recompilation

Next Steps

- Files, without executables/DLLs, sent to the IBIS-ATM reflector
  - Need to post full set to IBIS public pages

- Do the DLL and Test executable files need updating for the BIRD?
  - Need recompilation to 64-bit for the DLLs at least
  - Bug fixes and some security checks are needed (e.g., safe string handling)

- Is RX of interest?
  - Cadence IBIS AMI Evaluation Tool (RX) v3.1, March 22, 2011
  - https://ibis.org/macromodel_wip/archive/20110322/ambrishvarma/Cadence%20IBIS%20AMI%20Evaluation%20Toolkit%20v3.1/Cadence_IBIS_AMI_Evaluation_Toolkit_v3_1.zip

Thank you!