What's expected for IBIS-AMI Model From the perspective of end-user support



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Introduction

- IBIS-AMI simulation would be thought as simple and easy method to check SerDes/Transceiver PHY behavior.
- >What do you expect to IBIS-AMI simulation?
 - -Correlation between hardware and simulation
 - -Simulation time
 - -No differences between simulators, channel modeling ...

IBIS-AMI simulation topics



IBIS-AMI simulation is simple enough

>What we need to prepare

- -IBIS-AMI simulator
- –IBIS-AMI Tx, Rx and Package model
- -Channel model
- Run simulation

- : Provided by EDA vendor
- : Provided by device vendor
- : Provided by User





Rx_AMI1

What kind of IBIS-AMI problem did happen ?

- 1. Simulator does not work
- 2. It seems that measurement and simulation are not matched ...
- 3. Simulation results of the simulator A and simulator B differ ...
- 4. Parameter setting for IBIS-AMI model and simulator
- 5. How to do Channel modeling
 - Transmission line model
 - S-parameter
- 1-2 are not discussed in this presentation

From the perspective of end-user support ...

- Those problems are not easy to handle
- Knowledge of both the IBIS-AMI model and IBIS-AMI simulators is required
 - 1. Simulation results of simulator A and of simulator B differ
 - 2. Parameter setting for IBIS-AMI model and simulator
 - 3. How to do Channel modeling

1. Simulation results of simulator A and simulator B differ ...

Our simulation results and customers' simulation results did not correlate well



Which result should we believe ?

2. Parameter setting for IBIS-AMI model and simulator

>Simulator

- -Data pattern, Data rate
- -Ignored bits
- -Block size

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- -Samples Per Bit
- -Enforce passivity

>IBIS-AMI Model

-Several parameters but those are needed to follow user guide's instructions

3. How to do Channel modeling

> It depends on customers and we can use

- -Transmission line model (u-Element, w-Element, ...)
 - There are no frequency limit
- -S-parameter model
 - There are frequency limit
 - Discrete data

3. How to do Channel modeling – Cont.

>Which is better for IBIS-AMI simulation?

-We will not be able to have an exact answer for this, but it would be nicer to have guidance

Concerns

- -Can we mix S-parameter and T-Line model?
- –How do we confirm the quality of the S-parameter?
 - Interpolation method??
 - How many data points are needed??
 - Frequency limitation

IBIS-AMI Simulation Debugging Topics



How to identify the root cause of IBIS-AMI simulation issue

>We need to debug against

- 1. IBIS-AMI model
- 2. Channel model
- 3. IBIS-AMI simulator
- -Regarding IBIS-AMI model and IBIS-AMI simulator, we need to tune the settings or the parameters
- However, debugging IBIS-AMI simulation parameters would not be easy for users

Debug point 0) Simulation log

>Did you check the simulation log file?

>Are there any warnings or errors??

-Those can tell us a lot of information



Debug point 1) Check S-parameter quality

- Did you do "S-parameter passivity check"?
- Did you do "S-parameter causality check"?
- >IBIS-AMI simulators have a check tool
 - -The tool can let us know if the S-parameter fails passivity / causality check

Debug point 2) What is "Enforce passivity"

Enforce passivity flow

- –When selected, S-parameter passivity will be enforced
- -Calculating the largest eigenvalue of the S-parameter matrix at each frequency point.
- -Scaling the S-parameter matrix to normalize eigenvalues

This option should be treated carefully

–If such S-parameter characteristic is not intended, "Enforce passivity" option should not be selected.

Debug point 3) Impulse response tells us lots

- IBIS-AMI simulator outputs Impulse response information and that would give you hints
 - -Impulse response waveforms are not matched between simulators
 - -Impulse response waveforms are not matched between different channel models
 - Impulse response waveforms are matched well. But eye-diagram shape are not the same between simulators





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Summary



Summary

>What's expected for IBIS-AMI simulation?

- -No simulator dependency
- -No channel modeling dependency
- –Unified methodology is welcome to improve IBIS-AMI simulation quality





