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Practical Measurement vs. Simulation Correlation with DDR2 667 Interface

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People say :
IBIS model is NOT accurate.

Is that really TRUE?

People say :
HSPICE model is essential for design.

Is that really TRUE?

Let’s see what’s happening in the real world and make wise decisions!!

Experiments

Step1

For a given target system, prepare following;

1. Measurement waveforms
2. Simulated waveforms using IBIS model
3. Simulated waveforms using HSPICE model

Step2

Verify accuracy with figure of merit method
(100% is perfect match)

Step3

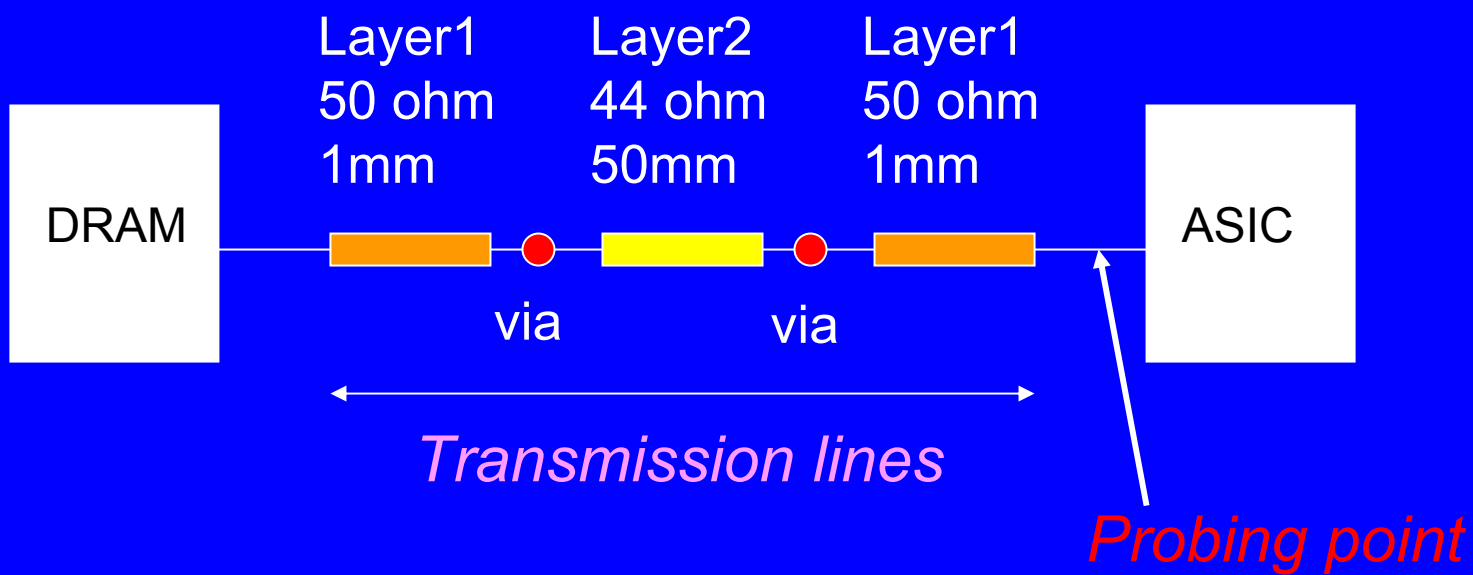
Compare simulation time

Target System

Digital consumer system

Point-to-point application

Memory interface with 333MHz (DDR2 667)



Parameters extracted from real design using Cadence Allegro

Simulation condition

Models

Memory device:

DDR2-667 333MHz DRAM

IBIS model created by ***HITACHI ULSI systems***

Receiver:

ASIC Model

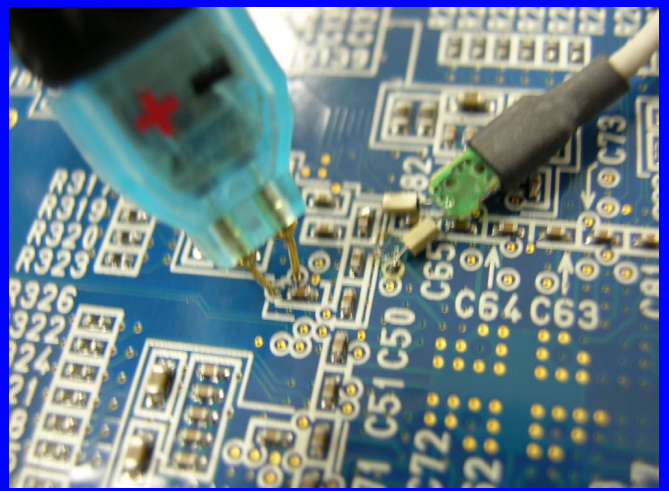
provided from system vendor

Tool

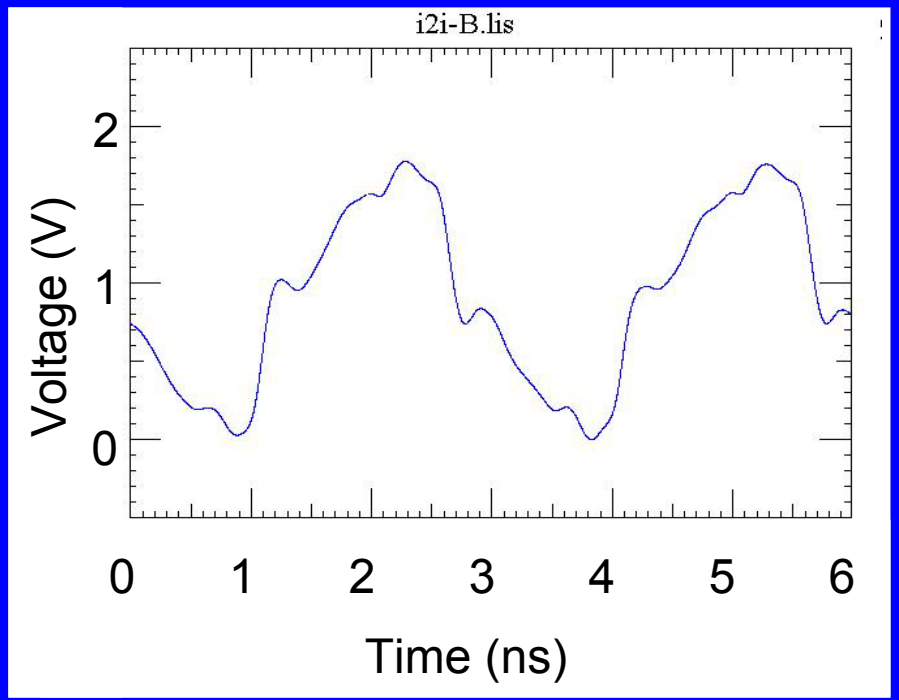
Synopsys HSPICE 2005.3 SP1

Measurement equipments

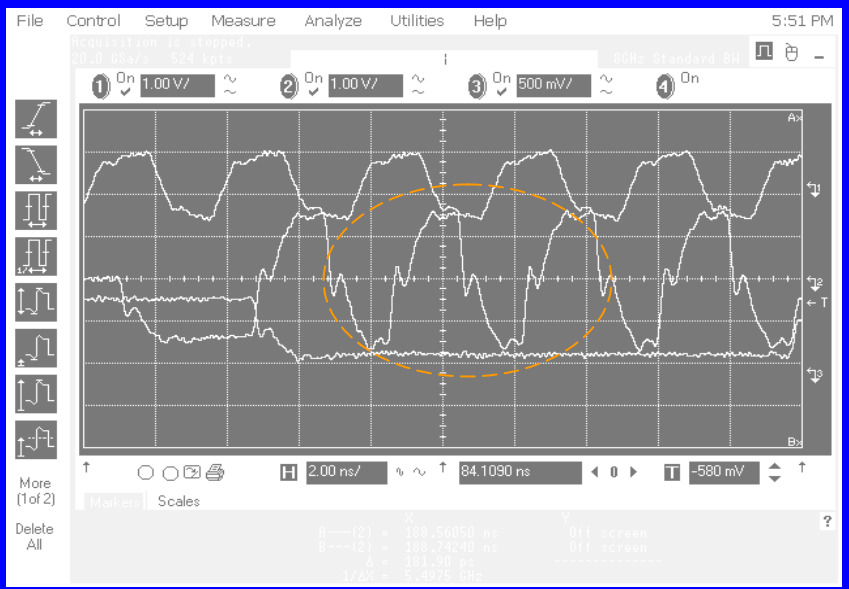
Oscilloscope:
Agilent technologies
 Infiniium54855A 6GHz 20GSa/sec
 InfiniiMax1134 probe
 Single-End Solder (E2679A)



IBIS vs. Measurement



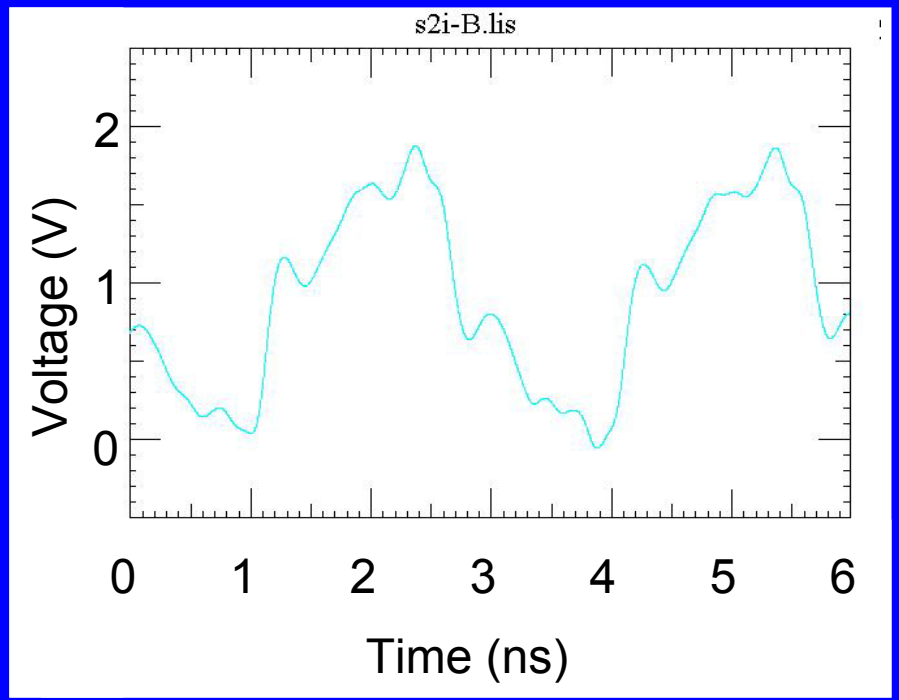
DRAM IBIS model



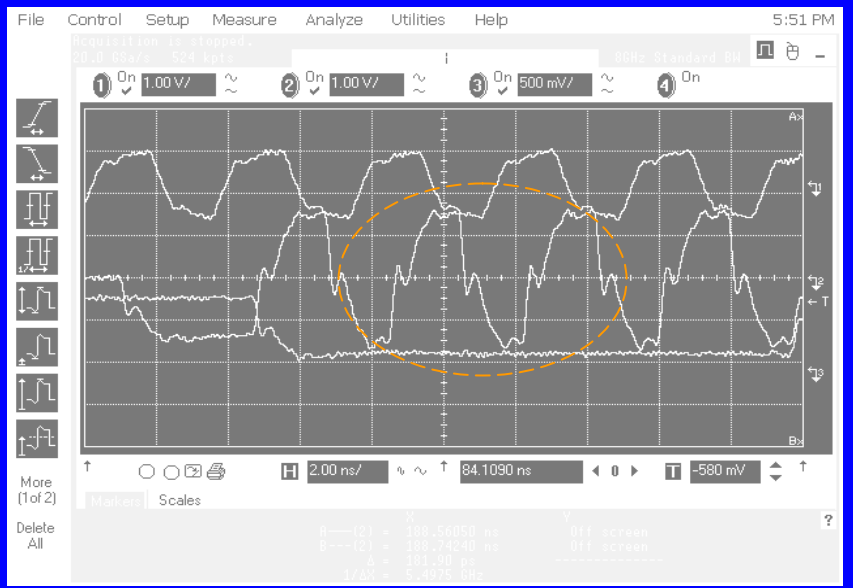
Measurement waveforms

Good match with Figure Of Merit of 96%

HSPICE vs. Measurement



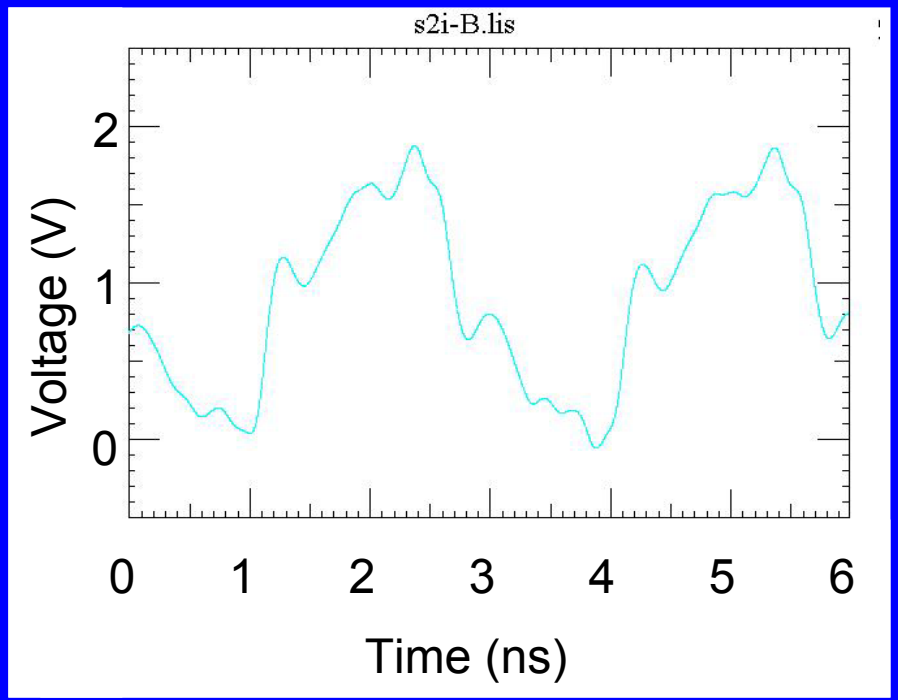
DRAM HSPICE model



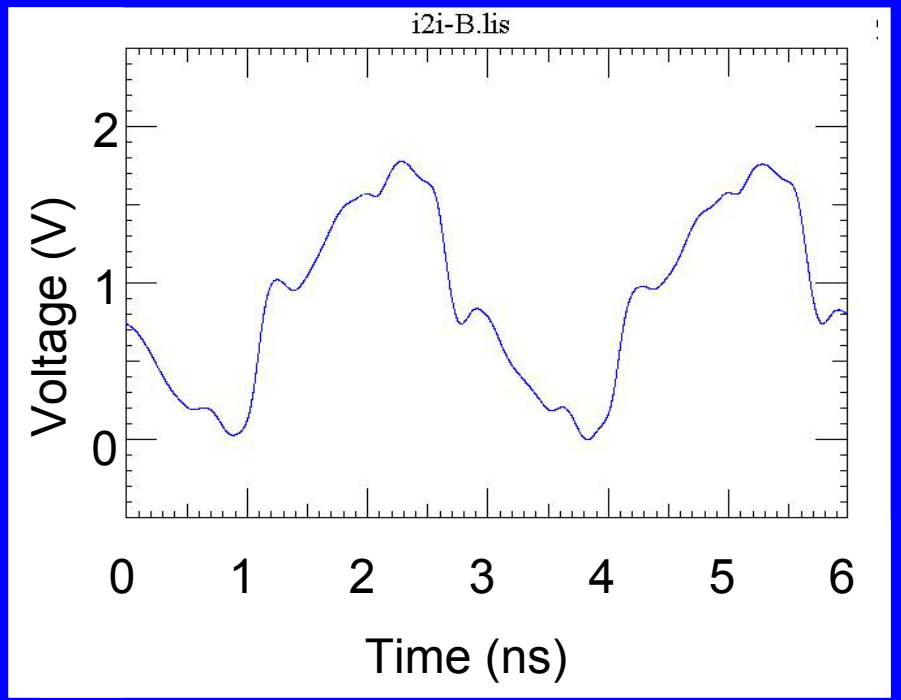
Measurement waveforms

Close match with FOM of 96%

IBIS vs. HSPICE



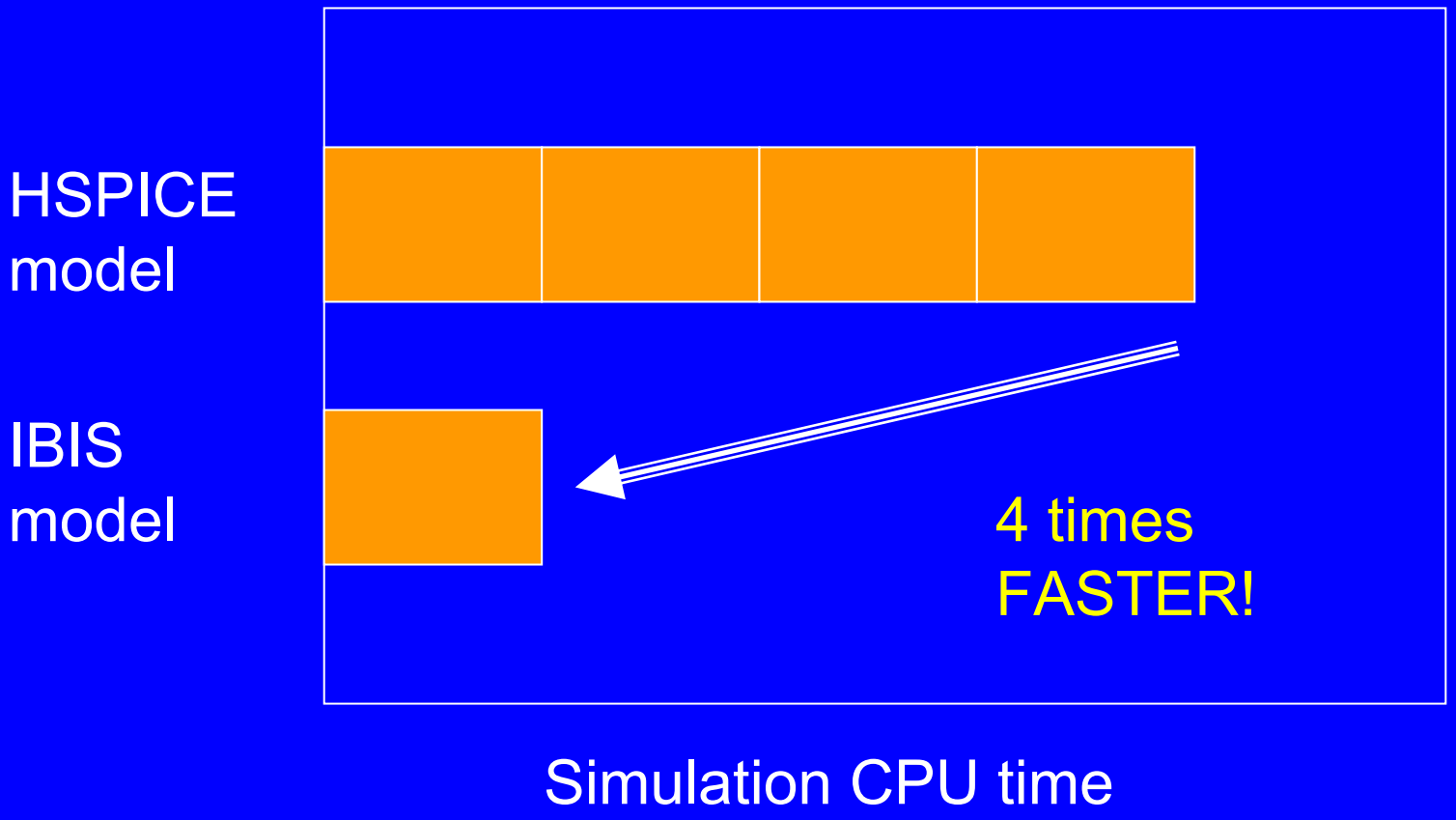
DRAM HSPICE model



DRAM IBIS model

Nearly equal with FOM of 98%

Simulation time comparison



Summary

1) Simulation results of DDR2 667 system shows IBIS & HSPICE DDR2 memory model simulation Correlation with measurement within FOM of 96%

2) IBIS model simulation faster than HSPICE model by four times.

3) Using IBIS model simulation is fairly accurate and fast. Good choice for practical purpose.

Thank you!