WELCOME FROM MICHAEL MIRMAK, INTEL CORPORATION

On behalf of the IBIS Open Forum, I would like to welcome you to the fourth annual Asian IBIS Summit (China). We are very pleased to once again meet in Shanghai with our friends from across the People's Republic. Our relationship with IBIS users and developers in China has been excellent in recent years and we have received many helpful contributions toward improving the specifications we manage. These summits both help strengthen our relationship and allow us to say "thank you" to IBIS participants in China.

As always, we are deeply grateful to our generous co-sponsors for making these summits possible. We also greatly appreciate you, the attendees, whose enthusiasm help make these events successful.

After the summit, we invite you to continue participating, with your questions, comments and suggestions, in the online IBIS community. We hope you find the summit rewarding.

- Michael Mirmak Chair, IBIS Open Forum

我仅代表 IBIS 开放论坛, 衷心地欢迎您参加第四届亚洲 IBIS 技术研讨会(中国)。 我们非常高兴再次与我们的朋友在上海见面。近年来,在中国的 IBIS 用户和开发 商与我们保持着的极好的关系, IBIS 接受了许多有用的建议来改进 IBIS 标准。亚 洲 IBIS 技术研讨会加强了我们的关系,请允许我们说"谢谢您"对 IBIS 关注及参 与。

一如既往,我们非常感谢赞助商对我们支持使亚洲 IBIS 技术研讨会成为可能。我们也感谢您,各位与会者,使亚洲 IBIS 技术研讨会成功。

在亚洲 IBIS 技术研讨会以后,我们恳请您继续参与 IBIS 各项活动和工作,提供您的问题,评论和建议。我们希望亚洲 IBIS 技术研讨会对大家有所收益。

马梦宽 IBIS委员会主席



WELCOME FROM LI, JINJUN, HUAWEI TECHNOLOGIES

Dear Experts, Ladies and Gentlemen,

Since the year of 2005, IBIS Asian Summit in China has been successful meeting on high-speed design topics. This year the attendance, paper quality and quantity have increased, and more companies are joining as sponsors.

Huawei continues to support the IBIS Committee.. Last year, Huawei made some progress in areas such as validation of models by measurement.

Welcome everyone.

Best Regards, Li Jinjun Huawei Technologies

各位专家,各位来宾,

自从 2005 年以来, IBIS 已经成为了中国国内高速设计的一次盛会。现在, 不 仅内容一届比一届更深入, 范围更广泛, 赞助厂商和参加人数都在增加。

华为一如既往支持 IBIS 组织的活动。华为在过去一年中在这个领域也做了很 多工作,取得了一些进步,如测试验证模型的建议。

谢谢大家

华为公司 厉进军



Shenzhen 2005

Shanghai 2006

Beijing 2007



AGENDA AND ORDER OF THE PRESENTATIONS

(The actual agenda might be modified)

	IBIS SUMMIT MEETING AGENDA
8:15	REFRESHMENTS & SIGN IN - Vendor Tables Open at 8:30
9:00	Welcome - Li, JinJun (Huawei Technologies, China) - Mirmak, Michael (Chair, EIA IBIS Open Forum, Intel Corporation, USA)
9:20	Look into IBIS Buffer Curves
9:50	Study of Solving IBIS Single VT
10:20	BREAK (Refreshments and Vendor Tables)
10:35	Micron's IBIS Model Quality Process
11:05	Using Behavior-level Model for SSN Analysis 33 Yang, ZhiWei and Zhu, ShunLin (ZTE Corporation, China)
11:35	New Table-based Keywords in IBIS 5.0, A Cookbook-style 42 Guide Mirmak, Michael (Intel Corporation, USA)
12:00	FREE BUFFET LUNCH (Hosted by Sponsors) - Vendor Tables

AGENDA AND ORDER OF THE PRESENTATIONS (Continued)

- 13:30 IBIS EBD Modeling, Usage and Enhancement, An Example . . . 50 of Memory Channel Multi-board Simulation Xu, Tao (Sigrity, China)
- 14:00 Touchstone Version 2.0 Mixed-Mode Syntax 59 Ross, Bob (Teraspeed Consulting Group, USA)
- 14:10 Optimum Frequency Sampling in S-Parameter Extraction . . . 67 and Simulation Huang, JingHua (Synopsys, China)
- 14:40 System-level Serial Link Analysis using IBIS-AMI Models . . 80 Westerhoff, Todd (Signal Integrity Software (SiSoft), USA)
- 15:10 BREAK (Refreshments and Vendor Tables)
- 15:25 **IBIS-AMI Support via VHDL-AMS 92** Muranyi, Arpad* and Hou, MingGang** (Mentor Graphics Corporation, USA* and China**)

- 16:25 Quasi-Analytical Estimation of Very Low Bit Error Rate . . 116
 Lu, DingQing*, Gupta, Sanjeev**, Marcu, Mihai**, and
 Yuan, XuLiang*, (Agilent Technologies, *China and **USA)
- 16:55 Accurate GHz Channel Simulation and Statistical 124 Analysis for SSE (Solution Space Exploration) Li, BaoLong* and Hou, WeiPing** (*Ansoft and **Huawei Technologies, China)
- 17:25 Concluding Items
- 17:30 END OF IBIS SUMMIT MEETING









































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model extractor in IBIS model file in order to improve accuracy of Method 1.

SYNOPSYS

Quality Reports – C_comp, ODT & Slew Rates vs.													
Specification													
C_comp					ODT								
	IBIS		BIS	Datasheet (DDB3-1600)					тур	MIN	мах		
		Min	max	min max	Vinl	(V)			0.575	0.5375	0.6125		
	C_comp	1.55pF	1.94pF		Vinh	(V)			0.925	0.8875	0.9625		
DQ	C package	0.20pF	0.26pF										
	C_total	1.75pF	2.2pF	1.5pF 2.3pF	linl (A)			-0.0073	-0.0068	-0.00793		
INPUT	C_comp	0.6pF	0.91pF		linh	(A)			0.007425	0.00615	0.00789		
Later 1	C total	0.17pF	1.27pF (75pF 1.3pF	DH	Madal			00.77	00.10	07.00		
	C_comp	0.76pF	0.99pF		Rtt (Model) Rtt (datachast in units of 70/12)			23.77	22.12	27.03			
CLK	C package	0.20pF	0.21pF		Rtt (datasheet)			20.00	18.00	32.00			
	C_total	0.96pF	1.20pF ().8pF 1.4pF							01.00		
Slew Rates													
		Simulation			Datasheet								
			Model	Slew Rate (V/ns)	min	Тур	max	min	max				
			24 1066	Rising	2.27	2.84	3.88	2.5	5				
			_34_1066	Falling	3.24	4.03	5.17	2.5	5				
				Rising	3.15	3.25	4.31	3	5				
			DQ_34_1333	Falling	4.72	49	6.63	3	5				
			Dising	2.82	2.87	2 02	Ť	5					
	DQ		_34_1600	Falling	4.25	1 15	6	2	5				
				Failing	4.20	4.45	0	3	5				
	Aficro	HT.		November 08					© 2008 Micron	Technology, In	s. 14		





















New Table-based Keywords in IBIS 5.0 A Cookbook-style Guide

马梦宽 ^{英特尔公司} IBIS 委员会主席

Michael Mirmak

Intel Corporation Chair, IBIS Open Forum michael.mirmak@intel.com

> IBIS Summit Shanghai, China November 11, 2008

亚洲 IBIS 技术研讨会 中国上海 2008 年 11 月 11 日

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Two New IBIS 5.0 Table-Based Keywords

[ISSO_PD], [ISSO_PU]

- Originally called BIRD97/98
- Characterizes buffer current modulation due to supply variation
 For example, SSO, "droop" or "bounce" events
- Tools today scale the [Pulldown]... I-V tables, which is inappropriate
- Each one a table of current vs. voltage (I-V) data, per corner

• [Composite Current]

- Originally called BIRD95
- Characterizes currents from the supply rail through the buffer, as the buffer switches into a known load
- A table of voltage vs. time (V-t) data, per corner
- Resolves ambiguous rail current distribution from known pad current
 - For example, can capture crowbar and/or pre-driver currents
 - Tools today "guess" at buffer current distributions

*Other names and brands may be claimed as the property of others







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Additional Notes

Support

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- IBISCHK5 parser should be available in the first half of 2009
- No tools today support these keywords, or automatically extracting data for them

Today's Options

- SPICE templates can be created to extract the data manually
- Composite Current data can be used with existing models in a SPICE implementation (see References)
- The IBIS 5.0 specification contains guidance on [ISSO_PD], [ISSO_PU] adjustments to how I-V and V-t data interact

































































































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Interp	Interpolation method comparison			
Inter- /extrapolation method	Numerical polynomial approximation (Piecewise constant, linear, spline, etc.)	Partially apply rational function approximation	Hybrid method	
Advantages	. Quick . Bounded error	. Consider causality . Accurate phase estimation	. Combing advantages of several methods	
Disadvantages	. Causality & passivity issue . Phase estimation difficulties	. Time consuming . Passivity violation . Noise sensitive	. False switch between each method . Noise sensitive	
Suggestions	Efficient for most common cases	Usually used in hybrid method	Use for cases with local resonances	
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	Interpolation method comparison				
	Base data format	Real/Imaginary(RI)	Magnitude/Angle(MA)		
	Advantages	. No phase over- estimation issue in local resonance region	. Smooth curves connecting given sample points (more physical)		
	Disadvantages	. May under-estimate phase information . Straight line between given sample points (unphysical)	. May over-estimate phase change in local resonance region		
	Suggestions	use with very dense table model	Efficient for most cases		
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Data pattern Channel 1	Eye Height (mV)	Eye Width (UI)
CJPAT(8B/10B)	100	0.59
PRBS 7	104	0.64
PRBS 31	91	0.54
Data pattern Channel 2	Eye Height (mV)	Eye Width (UI)
CJPAT(8B/10B)	21	0.33
PRBS 7	45	0.58
PRBS 31	15	0
Data pattern Channel 3	Eye Height (mV)	Eye Width (UI)
CJPAT(8B/10B)	3	0.11
PRBS 7	41	0.71
PRBS 31	16	0




























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Background and related works

Very low BER estimation for system with ISI, Jitter and Noise is needed

Monte Carlo (MC) is very slow

Very few simulation runs contribute to error events in the statistics

Fast BER techniques have been proposed

- Importance sampling a way to speed up simulation
 - More simulation runs contribute to error events in the statistics
- QA estimation is very efficient
 - 100% simulation runs contribute to error events in the statistics
 - We need to know its statistical properties

Agilent Technologies

Ina Oser Group Meeting System Design 단기 4341년 10월 11일



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System model $a_k = -A$ Ho: H1: $a_{k} = +A$ Under Ho, BER is given by: $P_0 = \int_{\Omega_0} f^0(v_s) f_n(v_n) dv_s dv_n$ pdf under Ho Noise pdf and $\Omega_0 = [(v_s, v_n) : v_s + v_n \ge T_0]$ Under H1, BER is given by: $P_{1} = \int_{\Omega_{1}} f^{1}(v_{s}) f_{n}(v_{n}) dv_{s} dv_{n}$ pdf under H1 Noise pdf and $\Omega_{1} = [(v_{s}, v_{n}) : v_{s} + v_{n} \le T_{1}]$ The error probability for the system is given by $P_{e} = P(H_{0})P_{0} + P(H_{1})P_{1}$ where $P(H_0)$ and $P(H_1)$ are prior probabilities for Ho and H1, respectively With the assumption of equal prior probabilities for H0 and H1, symmetry of the noise density, and channel symmetry: $P_{1} = P_{0} = P_{1}$ Agilent Technologies

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Accurate GHz channel simulation and statistical analysis for SSE(Solution Space Exploration)

Asian IBIS Summit Shanghai China Nov11, 2008

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