IBIS Open Forum
Spice to IBIS
Subcommittee Status
Report

June 21, 1999

Presented by:

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•Michael Cohen - Has been a participant in the IBIS Open Forum since January, 1999. Michael has been a user of IBIS for four years, and is currently the Analog Simulation Librarian for IBM Personal Systems Group. In this role, he is in constant contact with ASIC Vendors, and works with them to develop IBIS models.

•Ian Dodd -Has been leading the development of Signal Integrity tools for over 6 years and is presently the Technical Manager of the Veribest SI development group. Ian has participated in the IBIS Open Forum for four years, and wrote the current generation of Veribest transmission line simulators which directly utilizes IBIS models.

•Syed Huq - Signal Integrity Engineer. Developed IBIS models while at National Semiconductor. Presently a user of IBIS models at Cisco Systems. Also former Vice-Chair of the IBIS committee and active participant since 1994.

•Mike LaBonte - Develops modeling tools and models for the SPECCTRAQuest PCB design and simulation product suite at Cadence Design Systems. The Cadence simulator has supported IBIS since 1993. Mike works with major system and chipset companies to maintain simulation and model support for cutting edge technologies.

•Arpad Muranyi - Was one of the founding members of the IBIS specification and Open Forum and has produced IBIS models ever since the beginning for both internal and customer use. Arpad runs extensive system level interconnect simulations with the behavioral models he developed in HSPICE during the early 90's using the controlled elements. He also helped the developer at AVANT! with the implementation of the new B-element that reads IBIS models. Arpad wrote numerous BIRD’s and is actively involved in introducing enhancements to the specification.

•Bob Ross - Modeling Engineer for over 8 years. The last 6 years, Bob has been involved with IBIS models in Interconnectix B.U. of Mentor Graphics and also with the EIA IBIS Open Forum. Bob is the current Chairperson of the IBIS Open Forum Committee.

Mission Statement

The purpose of the Spice to IBIS Subcommittee is to determine if the IBIS Open Forum Committee should become responsible for the Spice to IBIS translator code.

Mission Statement (Cont.)

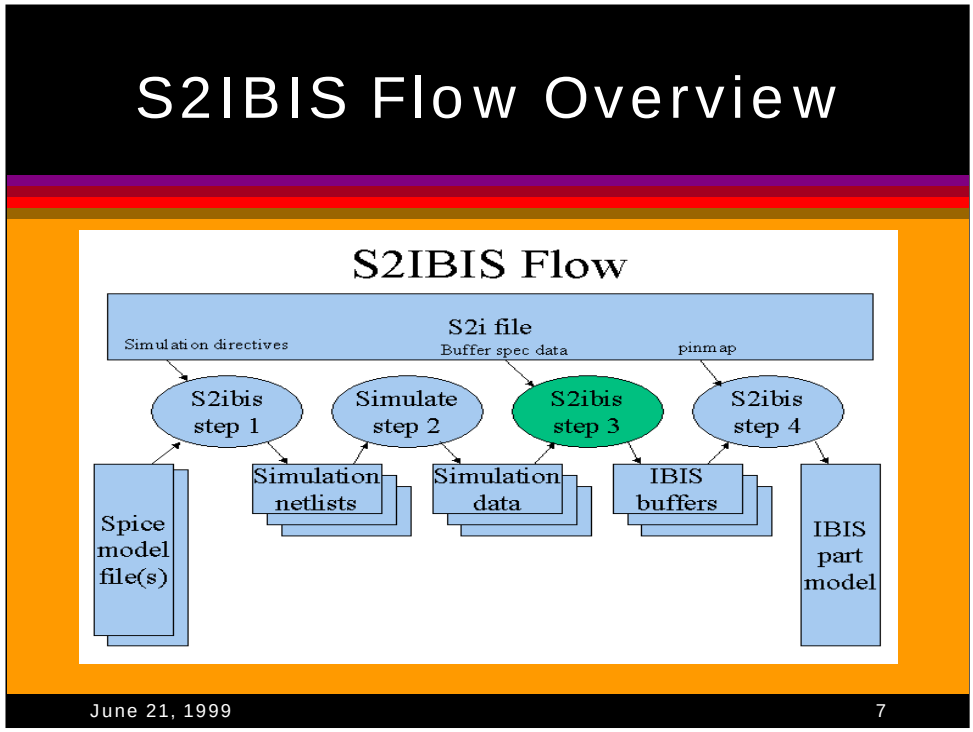
If the IBIS Open Forum Committee becomes responsible for the Spice to IBIS translator code, the secondary mission will be to draft the new requirements and determine how to fund the project.

What Has Happened

- The Spice to IBIS Subcommittee was formed via the IBIS Open Forum Teleconference on May 28, 1999.
- Three teleconferences have been held since:
  - June 3, 1999
  - June 11, 1999
  - June 17, 1999

What Has Happened (Cont.)

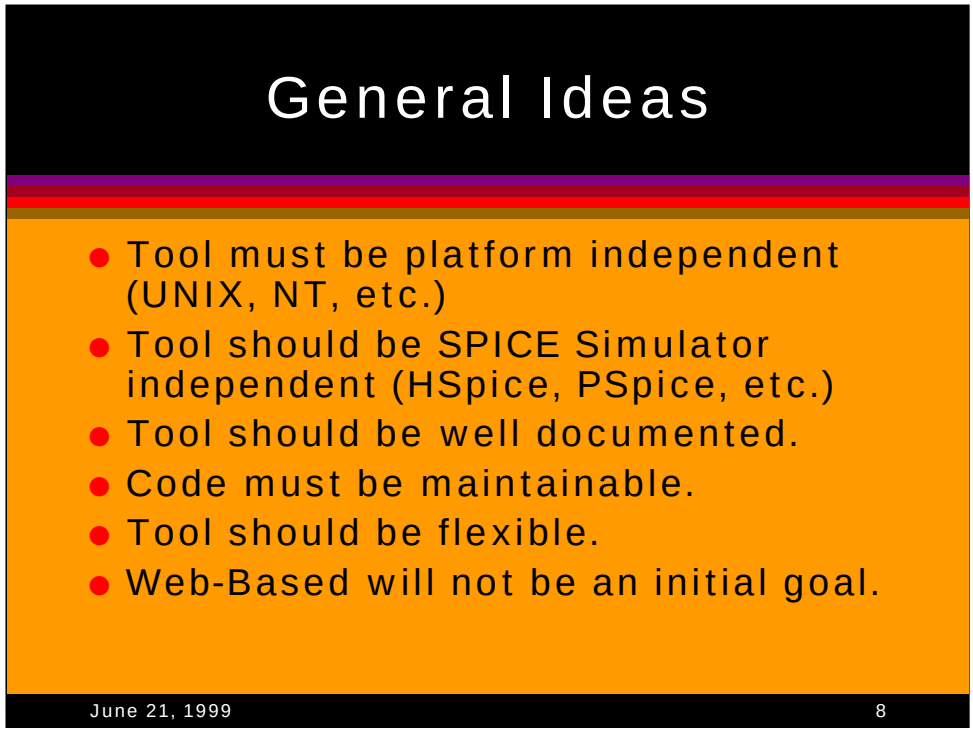
- Two postings to both the SI and IBIS Reflectors requesting feedback regarding Enhancement Requests and Bug Reports.



Drawing and Text from Mike LeBonte's note dated May 29, 1999:

The work performed by s2ibis2 can be broken into 4 parts, which are shown as ovals in the S2IBIS Flow diagram:

1) Given the spice model files and certain directives in an s2i control file, produce spice netlists that:
   a) Represent a series of simulation "experiments" that will yield data necessary to characterize one buffer.
   b) Contain control and measurement directives that are targeted for the specified simulator, and designed to produce the exact measurements that step 3 requires.
   c) Instantiate the given spice model by subckt call, expecting it to conform to certain rules. For example, the subckt must have a certain terminal order, must not contain test loads or supply voltages, and must not contain simulation directives that will affect the outcome. Most spice models must be modified to conform.
2) Run the target simulator for each netlist.
3) Parse the simulation data files and produce the IV and VT curves. There is significant algorithmic content in this step. Parsers are required for each expected waveform format. Some additional data required for this step comes from the s2i file, such as the specification of Vmeas and the technology type. (repeat steps 1 through 3 for each buffer involved)
4) Perform final assembly, copying items from the s2i file into the output IBIS file, as well as model data for each of the buffers. This step is more or less rote, and the user really ends up typing a good deal of information into the s2i file, that ultimately ends up in the IBIS file as-is.



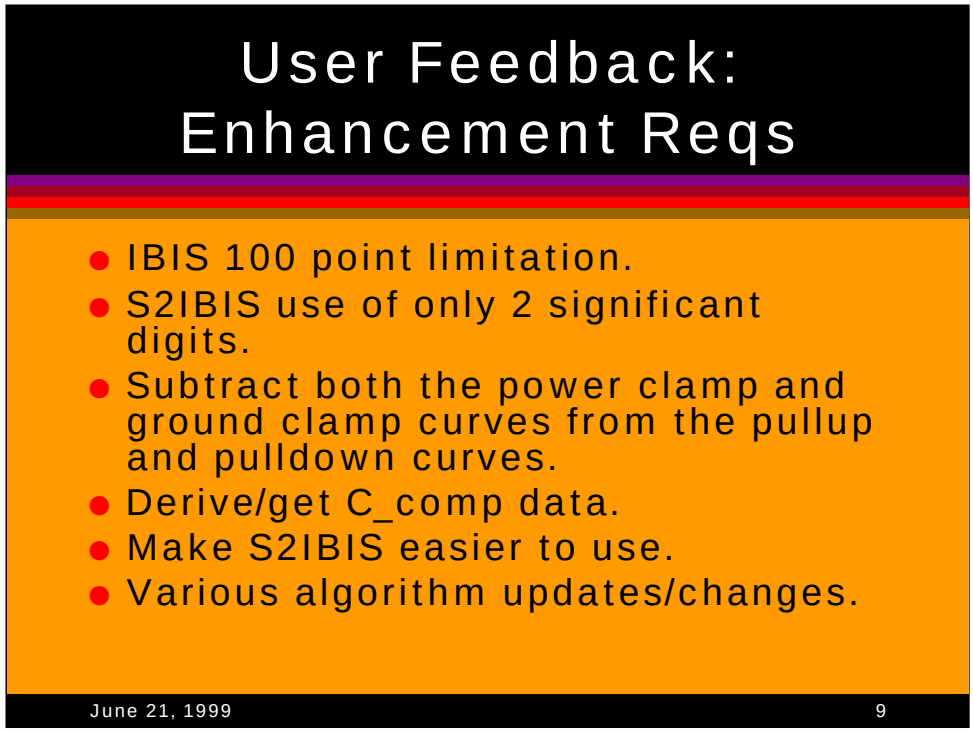
•For Spice independence, it was suggested to have a “config” file for each of the various SPICE languages supported.

•Documentation should include “User Manual” as well as well documented code. Examples may also be good.

•Maintainability: Current YACC and LEX may need to be removed and replaced by C++, or equivalent, to make easier to support.

•Flexibility: S2IBIS should have flexibility, such as generating only the “TYP” curves, instead of generating all three curves: TYP, MIN, and MAX.

•Due to licensing and legal issues, making a Web-Based S2IBIS is not going to be a goal at this time.



•The biggest issue to hit the IBIS/SI Reflectors was the IBIS 100 data point limitation. Although this is a point that will be taken up in the IBIS 4.0 definitions, there were many views discussed here. Views spanned removing the artificial limitation altogether, to making the S2IBIS program more intelligent, generating more points in the "knee" regions and fewer points in the linear regions.

• Example of 2 significant digits:
[Temperature Range] rounds/changes 125 to 0.12k so you get 120 instead of 125 deg.

•Currently, S2IBIS2 does not do anything with capacitance, such as C_comp.

•Per a current user: "I don't actually know that it requires redundant information, but it certainly takes a lot of fiddlin' work to get a new model created. So I'd certainly be in favor of an interface that minimizes the difficulty of use."

•Arpad Muranyi presented a paper, "In the spirit of continuous improvement in generating IBIS models", at the IBIS Face to Face Meeting, January 29, 1996 with the following algorithm suggestions (ver batim):

- •Sweep device from -Vcc to 2*Vcc twice, GND and Vcc relative.
- •Cut clamp curve which will include the resistor (R) at Vcc.
- •Cut other clamp curve at 0V.
- •Normalize (shift) clamp curve without R to zero current at 0V.
- •Extrapolate both clamp curves horizontally.

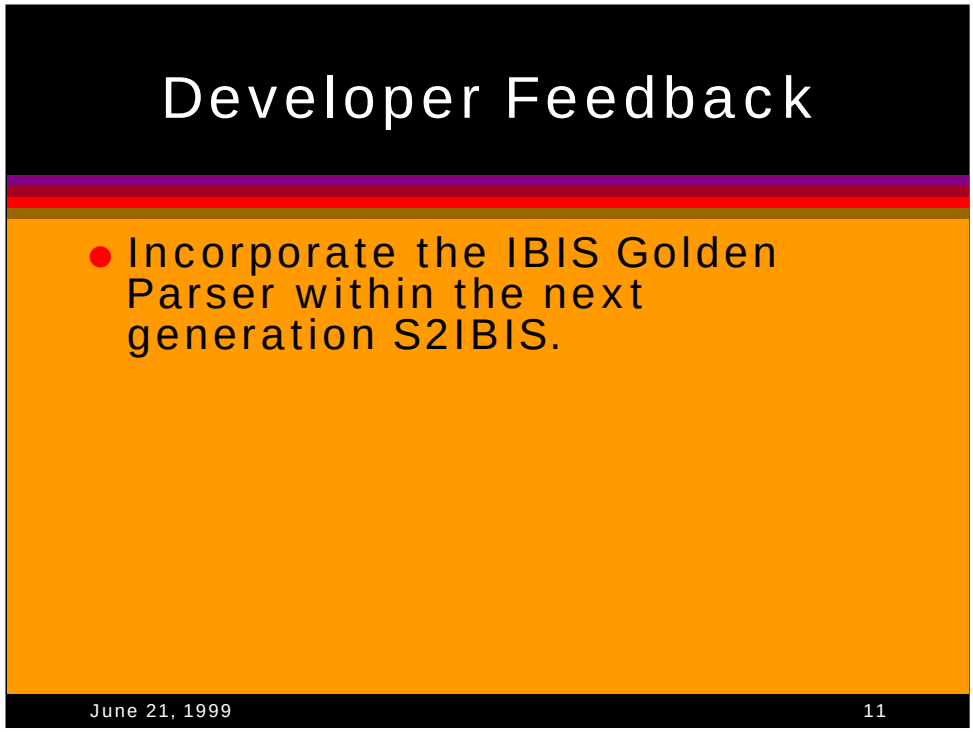
User Feedback: Bug Reports

- Negative dV/dt's with simtime=5ns
- Waveform table generation when using the Tr and Tf parameters.
- Possible pin name mangling with Alpha-numeric names.
- Make control file keywords be consistent with IBIS keywords.

1: Apparently when running with simtime=5ns, the dV/dt's are negative, but when running with simtime=8ns, the dV/dt's are positive as expected.

2: The bug will effect any behavioral modeling that might be done, when the risetime does not equal the falltime. In this case s2ibis2 uses the risetime value for the falling pulse.

3: [Vil] and [Vih] should be [Vinl] and [Vinh], respectively. Also, model type "Open_Drain" should be "Open_drain". These keywords are passed on to the IBIS files; hence, IBISCHK fails.



Per Michael Steer:

“The data structure used in s2ibisv2 is the IBIS structure prior to a big rearrangement that the consortium made towards the end of discussions. The golden parser and s2ibis have a lot in common. In both cases an internal representation of the IBIS specification must be developed. Therefore I believe that the next s2ibis project must use the same header files as the Golden parser. This is one way to make sure that their development stays in lock-step.”

What's Next

- Compile list of Enhancement Requests.
- Compile list of Bug Reports.
- Make recommendation to the IBIS Open Forum Committee.
- Generate requirements list.
- Determine how to fund project.
- Get bids on coding S2IBIS3.