

IBIS Interconnect BIRD

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Overview

- IBIS Interconnect Task Group
 - Meets Wednesdays 8AM PDT
 - http://www.eda.org/ibis/interconnect_wip/
- Similar Approach for Both IBIS and EBD
- Interconnect Modeling Capability
- IBIS (.ibs) Interconnect Model Terminals
- Touchstone Model Shortcut
- Pre and Post Layout IBIS Files
- Corners
- [Interconnect Model Selector]
- [Interconnect Model]
- [Begin Model]
- Terminal
- Terminals
- Next Steps

Similar Approach for IBIS and EBD

- IBIS (.ibs) Interconnect Model Terminals
 - Pins ([Pins])
 - Die Pads
 - Buffers
- EBD (.ebd) Interconnect Model Terminals
 - Pins ([Pin List])
 - reference_designator.pin

IBIS Interconnect Model Terminals

- Pins
- Die Pads
 - Signal (I/O)
 - Supply (POWER and GND)
- Buffers
 - Signal (I/O)
 - Supply
 - Pullup Reference
 - Pulldown Reference
 - Power Clamp Reference
 - Ground Clamp Reference
 - External Reference

Touchstone Model Shortcut

Touchstone models can be referenced directly without wrapping them in an IBIS-ISS subckt:

```
[Begin Model] TouchstoneSortucutExample
Source Touchstone_File
File Typ xyz.s2p
Number_of_Terminals 2
Terminals Pin:A1 Buf:A1
[End Model]
```

Is equivalent to:

```
[Begin Model] TouchstoneSortucutExample
Source IBIS_ISS
File Typ xyz.mod
Subckt Typ xyz
Number_of_Terminals 3
Terminals Pin:A1 Buf:A1 GND
[End Model]
```

```
File xyz.mod
.subckt xyz 1 2 Ref
S1 1 2 Ref mname=s_xyz
.model s_xyz TSTONEFILE='xyz.s2p'
.ends xyz
```

Pre and Post Layout IBIS Files

- Post Layout
 - Signal (I/O) Terminals
 - Pin, Die Pad and Buffer terminals are referenced by Pin_name (Pin Number)
 - Supply Terminals
 - Pin terminals are referenced by Pin_name or Signal_name
 - Die Pad terminals are referenced by Die_Pad_name or Signal_name
 - Buffer terminals are referenced by Pin_name or Signal_name
- Pre Layout
 - Signal and Supply terminals can also be referenced by Model_name

Corners

- File, Subckt and Parameter can have either a single value or three corner values
- If three values then they can be interpreted as
 - Delay
 - Typ/Slow/Fast
 - Crosstalk
 - Typ/Min/Max
 - ...
- File_Tip, Subckt_Tip and Parameter_Tip
 - Subparameters that can be used to document the three corner conditions for each parameter

[Interconnect Model Selector]

- [Interconnect Model Selector]
 - <Interconnect Model> * | In this file
 - <Interconnect Model> <File Name>
- [End Interconnect Model Selector]

[Interconnect Model]

- [Interconnect Model] <Interconnect Model>
 - [Begin Model] <interconnect model name>
 - ...
 - [End Model]
 - [Begin Model] <interconnect model name>
 - ...
 - [End Model]
 - ...
- [End Interconnect Model]

[Begin Model]

- [Begin Model] <interconnect model name>
 - Source <IBIS_ISS | Touchstone_File>
 - File <Typ | Min | Max> <file name>
 - File_Tip <Typ | Min | Max> <Tip>
 - Subckt <Typ | Min | Max> < Subckt >
 - Subckt_Tip <Typ | Min | Max> <Tip>
 - Parameter <name> <Typ | Min | Max> <Value>
 - Parameter_Tip <name> <Typ | Min | Max> <Tip>
 - Unused_Terminal_Termination
 - Number_of_Terminals <# Terminals>
 - Terminal | Terminals
- [End Model]

Terminal

- Terminal <terminal number> <Pin | DiePad | Buffer ...>
- One line per terminal
- Supports both Pre and Post Layout
- Example Terminal records

Terminal 1	Pin	Pin_name	M8	
Terminal 2	Pad	Pin_name	M8	
Terminal 3	Buffer	Pin_name	M8	
Terminal 4	Buffer	Pin_name	M8	Pullup_Reference
Terminal 5	Pin	Model_name	DQ	
Terminal 6	Pin	Model_name	DQS	Diff_pos
Terminal 8	Pin	Model name	DQ	SE
Terminal 9	Buffer	Pin_name	M9	Aggressor
Terminal 10	Buffer	Pin_name	M10	Victim
Terminal 11	Buffer	Signal_name	VDDQ	

Terminals

- Terminals <terminal 1> <terminal 2> <terminal 3> ...
- One line lists all terminals of subckt.
- Limited to Post Layout
- Example Terminals records

```
Terminals Pin:A7 Buf:A7
Terminals Pin:A7 Pad:A7
Terminals Pin_SIG:VDD Buf_SIG:VDD
Terminals Pin_SIG:VDD Pin_SIG:VSS
Buf_PUR:A7 Buf_PDR:A7
```


Next Steps

- Ongoing work refining interconnect IBIS and EBD BIRDs.
- Reviewing decision to support both Terminal and Terminals
- Reviewing how to handle Unconnected Terminals