IBIS-MCP Specification

Draft 0.1

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Change List

Added section header numbers

Removed all mentions of individual companies

Changed the name to IBIS-MCP (not globally done)

Added cover sheet

1. Introduction

This document describes ~~Sigrity~~ the IBIS Model Connection Protocol (IBIS-MCP).

MCP is used for connecting circuit models and/or physical layouts among dies (chip), packages, and PCBs.

MCP allows automated model and structure connections ~~within Sigrity products of~~ between any MCP models. ~~It also allows third party tools to integrate or connect Sigrity models with MCP.~~

MCP uses a simple ASCII format that supports multiple circuits and pins for model connections and allows physical pins to be lumped in circuit models.

MCP is extensible and backward compatible.

2. MCP File Format

MCP is a block that is inserted into a host file as a comment section. It uses the host file's comment leading strings as its leading string.

The MCP block is case insensitive.

The MCP block contains one or more component connections.

The MCP block is described as follows. Here, * is used as the example of the comment leading string used in SPICE circuits.

* [MCP Begin]

* [MCP Ver] *1.1*

* [REM] *comment till the end of the line*

* [Structure Type] *PKG*

* [MCP Source] *source*

* [Coordinate Unit] *unit*

* [Connection] *compName modelName totalNumberOfPins*

* [Connection Type] *DIE*

* [Power Nets]

* *pin cktnode net x y*

*…

* *pin cktnode net x y*

* [Ground Nets]

* *pin cktnode net x y*

*…

* *pin cktnode net x y*

* [Signal Nets]

* *pin cktnode net x y*

*…

* *pin cktnode net x y*

* [MCP End]

[MCP Begin] and **[MCP End]** mark the MCP block.

The contents of the MCP block are described below.

1. **[MCP Ver]** *1.~~1~~ 0* is a one-line item. It specifies the version of MCP. It is a required item.

2. **[REM]** *comment* is the MCP comment. It is a one-line item. The comment can also be in the form from the host, except in the net list section. In the net list sections, the comment must be in the form of MCP comments.

3. **[Structure Type]** *PKG* specifies the type of the extracted circuit model. It is a one-line item. It is optional. It can be a combination of the following (delimited by spaces) DIE, PKG, PCB.

4. **[MCP Source]** *source* specifies the origin of the circuit model. It is a one-line item. It can include the tool name, the tool version, and/or the date the model was created. This item is optional.

5. **[Coordinate Unit]** *unit* defines the unit used by the coordinates. *unit* can be one of the following, m, cm, mm, um, nm, mil. The default is m. This item is optional.

6. **[Connection]** *compName modelName totalNumberOfPins* starts a component connection section in the MCP block. It is a one-line item. This item is required. An MCP block should contain at least one component connection section. In the item, *compName* is the name of the component connection (or circuit name in SPD file, or reference designator in common layout tools); *modelName* is the model definition name of the component connection (or part number in common layout tools); and the *totalNumberOfPins* is the number of pins in this component connection. A new [Connection] line ends the previous component connection section and starts a new component connection section.

7. **[Connection Type]** *DIE* specifies the type of the component connection. It is a one-line item. It is optional. It can be a combination of the following (delimited by spaces) DIE, PKG, PCB, VRM, or SINK.

8. **[Power Nets]** starts the power pin section of the component. It is a one-line item. It is optional.

9. *pin cktnode net x y* lists the information for a pin. *pin* is the name of the pin. *cktnode* is the circuit node name used in the extracted circuit corresponding to the pin. *net* is the net of the pin. *x y* are optional and are the relative coordinates of the pin relative to the component origin. The five fields should be in one line.

10. **[Ground Nets]** starts the ground pin section of the component. It is a one-line item. It is optional.

11. **[Signal Nets]** starts the signal pin section (ends the [Power Nets] or [Ground Nets] section if exists) of the component connection. It is a one-line item. It is optional.

12. In the Power/Ground/Signal pin sections, comments must be in the MCP comment form as * [REM] *comment*.

1.3. MCP Samples

1. MCP in a Subcircuit

.subckt SigrityModel ExampleModel1 list_of_external_nodes

* The following is the MCP Section

****

* [MCP Begin]

* [MCP Ver] 1.01

* [MCP Source] Sigrity XtractIM 1.3.1 From simulation 12/31/2007

* [Coordinate Unit] um

*

****

* The following is the info for component connection U1

****

* [Connection] U1 Si_fc_die_3000 3000

* [Connection Type] *DIE*

* [REM]

* [REM] -----Power Pin List of U1----------

* [REM]

* [Power Nets]

* VDD01 CKT01 NET1 0 0

* VDD02 CKT02 NET1 200 0

* [REM]

* [REM] -----Ground Pin List of U1----------

* [REM]

* [Ground Nets]

* [REM] Pins of net NET2

* VSS01 CKT03 NET2 100 0

* VSS01 CKT04 NET2 300 0

* …

* [REM]

* [REM] ------------Signal Pin List of U1----------

* [REM]

* [Signal Nets]

* SIG01 CKT05 NET3 500 300

* SIG01 CKT06 NET3 300 500

* …

*

* [MCP End]

* This concludes the MCP section

    • *Contents of the subckt*

.ends

2. MCP Sample 2

The following package extraction example uses net-based approach (vs. per pin model) where all the ground pins are lumped as one circuit node in each circuit connection.

.SUBCKT psi_pkg_wb_pre-layout_032609_173742

+ die_1

+ die_6

+ die_3

+ die_4

+ BGA_VDD25

+ BGA_VDD125

+ BGA_1

+ BGA_2

+ die_GND1

+ die_GND1

+ die_GND1

+ die_GND1

+ BGA_GND2

+ BGA_GND2

+ BGA_GND2

+ BGA_GND2

*The following is the ~~Sigrity~~ MCP (model connection protocol) Section

****

*[MCP Begin]

*[MCP Ver] 1.0

*[MCP Source] ~~Sigrity PowerSI 8.1.32~~From simulation 3/26/2009

*

****

*

*[Connection] BGA BGA 21

*[Power Nets]

* 3 BGA_VDD25 VDD25

* 4 BGA_VDD25 VDD25

* 5 BGA_VDD25 VDD25

* 6 BGA_VDD25 VDD25
* 7 BGA_VDD25 VDD25
* 8 BGA_VDD25 VDD25
* 9 BGA_VDD25 VDD25
* 19 BGA_VDD125 VDD125
* 20 BGA_VDD125 VDD125
* 21 BGA_VDD125 VDD125
*
*[Ground Nets]
* 10 BGA_GND2 GND
* 11 BGA_GND2 GND
* 12 BGA_GND2 GND
* 13 BGA_GND2 GND
* 14 BGA_GND2 GND
* 15 BGA_GND2 GND
* 16 BGA_GND2 GND
* 17 BGA_GND2 GND
* 18 BGA_GND2 GND
*
*[Signal Nets]
* 1 BGA_1 DATA1
* 2 BGA_2 DATA2
*
*[Connection] die die 6
*[Power Nets]
* 1 die_1 VDD25
* 6 die_6 VDD125
*
*[Ground Nets]
* 2 die_GND1 GND
* 5 die_GND1 GND
*
*[Signal Nets]
* 3 die_3 DATA1
* 4 die_4 DATA2

*
*[MCP End]
*
*This concludes the MCP section
*Define the S element, the Model file is output from BNP
.MODEL Spara S

+ BNPFILE = "C:\~~Program Files\ Sigrity SpeedXP 8.1\PowerSI~~\Samples\psi_pkg_wb_pre-layout_032609_173742.bnp"

S

+ die_1 die_GND1

+ die_6 die_GND1

+ die_3 die_GND1

+ die_4 die_GND1

+ BGA_VDD25 BGA_GND2

+ BGA_VDD125 BGA_GND2

+ BGA_1 BGA_GND2

+ BGA_2 BGA_GND2

+ MNAME = Spara

*

.ENDS

*

*

4. ~~How Sigrity Tools Generate MCP~~ Notes on MCP Data Derivation

This section introduces some guidelines ~~used in Sigrity tools~~ to generate MCP.

1. Always output the **[MCP Source]** section.

   This section contains the tool name, the tool version, and the date when the model has been created in this section.

2. For the **[Connection]** *compName modelName totalNumberOfPin***:**

   • *compName* is the circuit name.

   • *modelName* is the circuit model definition name.

   • *totalNumberOfPins* is derived from the external node number if the model definition has external nodes, otherwise use the number of linkages instead.

3. **[Connection Type]** is optional.

   If you are not sure about the connection type, skip this section.

4. How to choose pin names

   a. If the package node connects to one circuit node, use the circuit node as the pin name.

   b. If the package node connects to more than one circuit node or does not connect to any circuit node, use the pin field of the package node as the pin name.

   c. If the package node does not connect to any circuit node and does not have pin field either, create a unique name (number) as the pin name.