

IEEE 1149.4 Mixed-Signal Test Bus Working Group Meeting Minutes

for
October 20th, 2005

8:00AM-9:45AM

Meeting Agenda:

Time	Topic	Responsibility
8:00 AM	1. Review the Meeting Minutes May 23rd, 2005.	Bambang Suparjo
8:20-9:40 AM	1. Semantic Rules Proposal Presentation. 2. Next Actions.	Heiko Ehrenberg Bambang Suparjo
9:40-9:45 AM	Summary and Adjourn	Bambang Suparjo

Meeting Attendees:

Name	Company
Adam Cron	Synopsys
Adam Ley	Asset-Intertech
Keith Lofstrom	Keith Lofstrom Integrated Circuits
Ken Parker	Agilent Technologies
Heiko Ehrenberg	Goepel Electronics LLC
Anthony Sparks	JTAG Technologies
Wim Driessen	JTAG Technologies
Bambang Suparjo	Mentor Graphics

1. Review the Meeting Minutes May 23rd, 2005.

Bambang welcomed the members to the meeting and presented the Meeting Minutes May 23rd 2005. Adam Ley suggested that the meeting minutes to be accepted.

- 1.1. Keith requested clarification on internal cell definition in minute 2.10. Keith was referring to section 8.1.3 in page 54 of the standard documentation. Adam Ley provided clarification where internal cell is part of the boundary registers but not associated to the chip boundary.
- 1.2. Adam Ley informed the group that he had a discussion with Adam Cron regarding the IDCODE. Code 0001 should not be used for EXTEST or any instructions other than IDCODE. It is fine to use code 0001 as a defined capture values for IDCODE.
- 1.3. Adam Ley was referring to minute 2.9 in his action item 3.1 and agreed that the safe value for D bit in ABM is 0.

- 1.4. On action item 3.2, Keith will provide description on internal cell and its application requirements.

2. Semantic Rules Proposal Presentation

Heiko presented the Semantic Rules Proposal shown in Appendix A. The items that need to be corrected are:

- 2.1. Replace “must” with “shall”.
- 2.2. Referring to port description, all ports with 1149.4 test resources shall be defined as inout.
- 2.3. Remove the item below from the Use Statement:

“alternative custom package files are allowed if they include the mandatory MST attributes and definitions specified in STD_1149_4_2005.all”
- 2.4. The opcode value for PROBE can be any values except all 1s.
- 2.5. Replace MST_TBIC_REGISTER with MST_TBIC and replace MST_TBICN_REGISTER with MST_TBICN.
- 2.6. Replace MST_DIFF_PINS_TABLE with MST_DIFF_PINS.
- 2.7. Provide checking on safe values, disable values and disable results.

Adam Ley suggested that the proposal to be accepted. Heiko will send the corrected version.

3. Summary and Adjourn

Bambang summarized the meeting and the teleconference was adjourned at 9:45 AM.

Appendix A – Semantic Rules Proposal

Semantic Rules, ABSDL (IEEE 1149.4)

- syntax rules for BSDL apply
(as defined in IEEE Std. 1149.1 Annex B, specifically section B.8)
- semantic rules for BSDL apply
(as defined in IEEE Std. 1149.1 Annex B, specifically section B.8)

- new semantic rules for ABSDL elements:

for the ABSDL file:

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\* Port description

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- => port ID's for the two ATAP pins (AT1 and AT2) must be specified, with pin type INOUT assigned to them
- => if the device has a differential ATAP, port ID's for the additional ATAP pins (AT1N and AT2N) must be specified, with pin type INOUT assigned to them
- => analog ports with dot4 test resources must be specified with pin type INOUT
- => analog differential ports with dot4 test resources must be specified with pin type INOUT (both the positive and negative port of the differential pair)

\* Use statement

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- => an USE-statement must exist for a (standard or custom) 1149.4 package file to obtain the MST attributes and definitions from
- => the 1149.4 standard package file string is "STD\_1149\_4\_2005.all"
- => alternative custom package files are allowed if they include the mandatory MST attributes and definitions specified in STD\_1149\_4\_2005.all

\* Instruction opcode

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- => PROBE is a mandatory instruction for a 1149.4 compliant device and therefor must be defined in attribute INSTRUCTION\_OPCODE
- => the opcode value for PROBE can be anything but all ones
- => recommendation as per 1149.1: don't use opcode value all zeros

\* Register access

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- => register access for the mandatory instruction PROBE shall be specified
- => PROBE must access the Boundary Scan register

\* Boundary Scan register cells

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- => Boundary Scan cells must be specified for TBIC Control (6.3):
  - \* Calibrate cell, functional value INTERNAL
  - \* Control cell, functional value CONTROL; must be listed in <disable\_spec> for the TBIC Base Partition's D1 and D2
  - \* D1 cell, AT1 pin, functional value BIDIR
  - \* D2 cell, AT2 pin, functional value BIDIR
- => Boundary Scan cells must be specified for TBICN control, if existent (6.5):
  - \* Calibrate cell (INTERNAL)
  - \* Control cell (CONTROL); must be listed in <disable\_spec> for the TBICN Base Partition's D1 and D2
  - \* D1 cell, AT1N pin (BIDIR)
  - \* D2 cell, AT2N pin (BIDIR)
- => Boundary Scan cells may be specified for TBIC extension control (6.4):
  - \* D1 cell (INTERNAL)
  - \* D2 cell (INTERNAL)
- => Boundary Scan cells may be specified for TBICN extension control, if existent:
  - \* D1 cell (INTERNAL)
  - \* D2 cell (INTERNAL)
- => Boundary Scan cells must be specified for analog I/O pins (single-ended and differential) (7.3.5):
  - \* Control cell (CONTROL)
  - \* Data cell, analog I/O pin (BIDIR)
  - \* B1 cell, AB1 (INTERNAL)
  - \* B2 cell, AB2 (INTERNAL)

for the MST user package:

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(MST attributes defined in standard package "Std_1149_4_2005" or in a custom package file)

* MST_Component_Performance

- => component conformance shall be specified with the attribute MST_Component_Conformance
- => the only valid <conformance string> is "STD_1149_4_1999";

* MST_ATAP_AT1, MST_ATAP_AT2

- => the ATAP ports shall be identified in attributes MST_ATAP_AT1 and MST_ATAP_AT2, respectively
- => the pin type for the two ATAP ports shall be defined in the <Port description> as INOUT;

* MST_ATAP_AT1N, MST_ATAP_AT2N

- => for a differential ATAP, the additional ATAP pins (AT1N and AT2N) shall be identified in attributes MST_ATAP_AT1N and MST_ATAP_AT2N, respectively
- => the pin type for the two additional ATAP ports shall be defined in the <Port description> as INOUT;

* MST_TBIC_Register

(refer to tables 1 and 2 in IEEE-Std.1149.4)

- => the cell assignment for TBIC control shall be specified in the attribute MST_TBIC_REGISTER
- => the first cell <Ca_num> in this attribute shall be the calibrate cell for the TBIC; the cell shall be listed in the Boundary Scan Register as INTERNAL cell
- => the second cell <Co_num> in this attribute shall be the control cell for the TBIC; the cell shall be defined in the Boundary Scan Register with function CONTROL and shall be listed in the <disable spec> for the ATAP ports
- => a <partition_name> for the TBIC Base Partition shall be specified with its two data cells <D1_num> and <D2_num>
- => TBIC extensions are specified with a <partition_name> and the assigned data cells; the listing order for multiple TBIC extensions is not relevant

* MST_TBICN_Register

(refer to tables 1 and 2 in IEEE-Std.1149.4)

- => if a differential ATAP is implemented in the device, the cell

- assignment for TBICN control shall be specified in the attribute MST_TBICN_REGISTER
- => the first cell <Ca_num> in this attribute shall be the calibrate cell for the TBICN; the cell shall be listed in the Boundary Scan Register as INTERNAL cell
 - => the second cell <Co_num> in this attribute shall be the control cell for the TBICN; the cell shall be defined in the Boundary Scan Register with function CONTROL and shall be listed in the <disable spec> for the additional ATAP ports
 - => a <Npartition_name> for the TBICN Base Partition shall be specified with its two data cells <D1_num> and <D2_num>
 - => TBICN extensions are specified with a <Npartition_name> and the assigned data cells; the listing order for multiple TBICN extensions is not relevant

* MST_Diff_Pins_Table

- => Boundary Scan data cell numbers for DBMs on the single-ended side of differential drivers/receivers shall be assigned to the respective differential port pair in attribute MST_DIFF_PINS_TABLE
- => first the representative port ID shall be listed, then the associated port ID, followed by the Boundary Scan cell number
- => the two port ID's must be defined in the port description (attribute <port>)
- => the DBM's Boundary Scan cell must be defined in the attribute <Boundary_Register>

* MST_ABM_Pins_Table

(refer to tables 6, 7, and 8 in IEEE-Std.1149.4)

- => Every ABM needs to be listed in attribute MST_ABM_Pins_Table
- => Each ABM must be listed with its port ID, as defined in the port description (attribute <port>), followed by the TBIC partition it is connected to and the four Boundary Scan cells assigned to the ABM control register
- => the TBIC partition name must be defined in <MST_TBIC_REGISTER>
- => if the ABM is connected to a TBICN partition, than that partitions name must be defined in <MST_TBICN_REGISTER>
- => the order of the Boundary Scan cell assignment in the ABM pin table is the following: Control cell (C_num), Data cell (D_num), B1 cell (B1_num), and B2 cell (B2_num)
- => a Boundary Scan cell assigned to <C_num> must be defined in <BOUNDARY_REGISTER> as CONTROL cell
- => a Boundary Scan cell assigned to <D_num> must be defined in

<BOUNDARY_REGISTER> as BIDIR cell and must have a
<disable_spec>
which specifies <C_num> as its control cell
=> a Boundary Scan cell assigned to <B1_num> must be defined in
<BOUNDARY_REGISTER> as INTERNAL cell
=> a Boundary Scan cell assigned to <B2_num> must be defined in
<BOUNDARY_REGISTER> as INTERNAL cell