**BUFFER ISSUE RESOLUTION DOCUMENT (BIRD)**

**BIRD NUMBER: 197.3\_draft\_4**

**ISSUE TITLE:** New AMI Reserved Parameters DC\_Offset and DC\_for\_Statistical

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**DATE ACCEPTED:**

**DEFINITION OF THE ISSUE:**

AMI modeling is now being applied to single-ended channels (e.g. DDR5). The current input to AMI\_Init is an Impulse Response. This forces all AMI simulations to be centered around the mid-level of the signal of a single-ended port. A DLL may need to know the single-ended voltage levels (e.g. to handle saturation in a DFE summer). On the other hand, to support statistical simulations, the Rx model needs to provide the EDA tool the Rx latch DC component. This BIRD proposes two new AMI Reserved Parameters. The first one, DC\_Offset, is the mid value of the beginning and end of the step response of the channel. The second one, DC\_for\_Statistical, is the DC component at the receiver latch used by EDA tools in statistical simulations.

**SOLUTION REQUIREMENTS:**

The IBIS specification must meet these requirements:

Table 1: Solution Requirements

|  |  |
| --- | --- |
| Requirement | Notes |
| 1. Allow the EDA tool to convey to the model the mid-point of the steady state high and low voltages found during analog model characterization of single-ended signals.
2. Allow the receiver model to convey to the EDA tool the mid-point of the steady state high and low voltages at the receiver latch used in statistical simulations.
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**SUMMARY OF PROPOSED CHANGES:**

Add new AMI Reserved Parameters DC\_Offset and DC\_for\_Statistical.

**PROPOSED CHANGES:**

*Parameter:* **DC\_Offset**

*Required:* No, and illegal before AMI\_Version X.x

*Direction:* Rx

*Descriptors:*

Usage:                   In

Type:                     Float

Format:                  Value

Default:                 <numeric\_literal>

Description:<string>

*Definition:* The mean value of the steady state high and low voltages of the channel at the Rx pad.

*Usage Rules:* If the impulse response was generated by differentiating the step response, then the value of DC\_Offset should be the same as the average of the step response initial and final voltages.

It is assumed that the waveform input to the Rx AMI\_GetWave function is the physical Rx input waveform minus this DC\_Offset. The Rx AMI\_GetWave function may choose to reconstruct the physical waveform by adding DC\_Offset to the input waveform.

*Other Notes:*

1. It is the responsibility of the EDA tool to determine the DC\_Offset. The EDA tool may use any method to do this.
2. The Rx AMI\_GetWave output waveform is the physical waveform at the Rx latch. It can have a non-zero DC component, which can be time-varying.

*Example:*

DC\_Offset (Usage In) (Type Float) (Value 0.5)

(Description “The EDA tool is responsible for determining the DC\_Offset value to input to the executable model.”)

*Parameter:* **DC\_for\_Statistical**

*Required:* No, and illegal before AMI\_Version X.x

*Direction:* Rx

*Descriptors:*

Usage:                   Out

Type:                     Float

Format:                  Value

Default:                 <numeric\_literal>

Description:<string>

*Definition:* The mid-point of the steady state high and low voltages at the Rx latch.

*Usage Rules:* Used by the EDA tool in statistical simulations. The Rx model determines the parameter value and returns it to the EDA tool. Default is 0V.

*Example:*

DC\_for\_Statistical (Usage Out) (Type Float) (Value 0.001)

(Description “The Rx model is responsible for determining the DC\_for\_Statistical value and returns it to the EDA tool to support statistical simulations.”)

**BACKGROUND INFORMATION/HISTORY:**

Typographical updates made in BIRD197.1, based on feedback from Open Forum and ATM review.

BIRD197.2 contains additional editorial changes.

BIRD197.3 contains editorial changes to the verbiage related to the usage of the words “single-ended”.

It also contains changes the Usage from In to InOut to allow the Rx AMI model to alter the value of the DC\_Offset.

It also contains changes of DC\_Offset Usage from InOut back to In and introduces the new reserved parameter DC\_for\_Statistical