**BUFFER ISSUE RESOLUTION DOCUMENT (BIRD)**

**ISSUE TITLE:** Support PAM4 in AMI Modeling

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**DATE SUBMITTED:** *{date you sent the document}*

**ANALYSIS PATH/DATA THAT LED TO SPECIFICATION:**

PAM4 is 4 level digital signaling as opposed to PAM2 or NRZ which is two level signaling currently supported in IBIS. In PAM4 each symbol or bittime in the waveform has four levels that correstpond to one of the following pairs of bit values 00, 01, 10, and 11.

The suggestion is to use a new reserved parameter “Encoding” to determine if the AMI model is either NRZ or PAM4.

An example of using Encoding

(Encoding (Usage Info) (Type String)(Value “PAM4”)

 (Description “This is a PAM4 model”)

)

**ANY OTHER BACKGROUND INFORMATION:**

{*These documents will be archived, so use this section to add any detail that is not part of the section above or the changed text itself , but should not be lost.}*

Of course the internals of an AMI model will differ if it is a PAM4 model; however the changes to using PAM4 models are limited to generating the Tx stimulus, and analyzing the Rx AMI\_Init and AMI\_GetWave functions. The stimulus input to the Tx AMI\_GetWave function will now have the four values -0.5, -0.1666, 0.1666, 0.5. The processing of the Rx AMI\_Init function will create an eye with three open eye sections; the Rx AMI\_GetWave will also produce an eye with three open sections. In both cases, the center open section will be centered on 0V, and the existing Rx\_Receiver\_Sensitivy parameter will operate the same in this eye as it does in the sing NRZ eye case. The center of the two additional eyes will occur at voltagesabove and below 0.0 Volts. The EDA tool is responsible for determining these additional voltage lvels and applying Rx\_Recever\_Sensitifity, Rx\_Noise, clock ticks, and clock jitter to this more complex eye.

The following optional Reserved Parameters is used to determin if an AMI Model is PAM4.

*Parameter:* **Encoding**

*Required:* No

*Descriptors*:

Usage: Info

Type: String

Format: Value

Default: “NRZ”

Description:<string>

*Definition:* If the value of Encoding is PAM4 then the EDA tool shall generate a 4 level Tx AMI\_GetWave stimulus input, and Rx AMI\_GetWave shall return an eye with three open sections. I not specified (or its value is NRZ) then the model is not PAM4.

*Usage Rules:*

*Other Notes:*

The stimulus input to the Tx AMI\_GetWave function will now have the four values -0.5,

-0.1666, 0.1666, 0.5. Rx AMI\_GetWave will also produce an eye with three open sections. Rx\_Receiver\_Sensitivity shall be used to analyze each of the three eyes.

*Example:*

(Encoding(Usage Info)(Value “PAM4”)(Type String)

 (Description " This is a PAM4 model."))