BUFFER ISSUE RESOLUTION DOCUMENT (BIRD)

BIRD ID#: TBD
ISSUE TITLE: *Resolving problems with Redriver Init Flow*
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ANALYSIS PATH/DATA THAT LED TO SPECIFICATION:

As currently written, the statistical reference flow for a Redriver makes the incorrect assumption that the downstream Rx equalization is determined from the downstream Tx equalization and the downstream channel. In order for the downstream Rx to properly determine its equalization, the impulse response input to the downstream Rx must also include the impulse response output of the Redriver Rx. The current flow it assumes that the Redriver Tx equalization is determined by the downstream channel.

The proposed revision contemplates introducing a new AMI Reserved Parameter Tx_Init_EQ_Depends_On_Input_IR (Init Equalization Depends on Input Impulse Response). Tx_Init_EQ_Depends_On_Input_IR is an Info, Boolean, Value parameter. It is allowed only on Tx AMI models. If the value of the Redriver Tx_Init_EQ_Depends_On_Input_IR is False, then the IR input to the downstream Rx should include the IR output of the Redriver Rx, the equalization of the Redriver Tx and the IR of the downstream channel. Since the equalization of the Tx is independent of the IR of the downstream channel, the following flows will give the same answer:

1. Input to Redriver Tx is IR of the downstream channel
    a. Input to downstream Rx is IR output of Redriver Tx convolved with the IR output of Redriver Rx
2. Input to Redriver Tx is IR output of Redriver Rx
    a. Input to downstream Rx is IR output of Redriver Tx convolved with the IR of the downstream channel
3. Input to Redriver Tx is IR output of Redriver Rx convolved with the IR of the downstream channel
    a. Input to downstream Rx is IR output of Redriver Tx
4. Input to Redriver Tx is a unit IR
    a. Input to downstream Rx is IR output of Redriver Tx convolved with the IR output of Redriver Rx and the IR of the downstream channel

Parameter: **Tx_Init_EQ_Depends_On_Input_IR**

Required: No

Direction: Tx

Descriptors:

Usage:	Info
Type:	Boolean
Format:	Value
Default:	\<Boolean\>
Description:	\<string\>

Definition: If True, the equalization performed by the AMI_Init function that is included in the Impulse Response output of AMI_Init is a function of the Impulse Response input to the AMI_Init function.

Usage Rules: Tx_Init_EQ_Depends_On_Input_IR is not allowed if Init_Returns_Impulse_Response if False.

Other Notes: When Usage is declared as In, this Parameter is also passed to the algorithmic model. The EDA tool continues to behave as described above. The use of a single Parameter to control both EDA tool and model behavior is intended to streamline the experience for the end-user.

Examples:

(Tx_Init_EQ_Depends_On_Input_IR (Usage Info)(Value True)(Type Boolean)
   (Description
     "The AMI_Init function modifies the equalization based on the input Impulse Response."
)
)

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> Step 7b. Retimer: The simulation platform uses the impulse responses returned by Rx1's AMI_Init in step 3 to perform a statistical simulation of channel 1. The simulation platform uses the impulse responses returned by Rx2's AMI_Init in step 6 to perform a statistical simulation of channel 2.

The following lines:

The statistical simulation flow for a Redrver link shown in Fig. 2 when Tx2 Tx_Init_EQ_Depends_On_Input_IR is False.

Step 1. The EDA tool obtains the impulse response of the upstream analog channel, which represents the combined impulse response of Tx1's analog model, physical channel 1, and Rx1's analog model.

Step 2. The output of step 1 is presented to the Tx1's AMI_Init function and Tx1's AMI_Init function is executed.

Step 3. The output of step 2 is presented to the Rx1's AMI_Init function and the Rx1's AMI_Init function is executed.

Step 4. The EDA tool obtains the impulse response of the downstream analog channel, which represents the combined impulse response of Tx2's analog model, physical channel 2, and Rx2's analog model.

Step 5. The output of step 3 is convolved with the output of step 4, and is presented to Tx2's AMI_Init function and Tx2's AMI_Init function is executed.

Step 6. The output of step 5 is presented to Rx2's AMI_Init function and Rx2's AMI_Init function is executed.

Step 7. Redriver: The impulse responses returned by Rx2's AMI_Init in step 6 is the full channel impulse response and is used to perform statistical simulation.