Introducing IBIS 7.2

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Agenda

- History

- Summary of Changes in IBIS 7.2

- Technical Change: Reference Flow Improvements

- Technical Change: PAMn

- Clocking and Other Clarifications

- Wrap Up

History

- IBIS 7.1 was approved December 10, 2021
    - Two BIRDs were still open and unapproved at this point

- IBIS Editorial Task Group re-convened August 17, 2022
    - Known Issues and Draft 0 documents made available then

- Final Draft (#7) distributed January 18, 2023

- Approved as IBIS 7.2 January 27, 2023

Entire IBIS document revision flow took 163 days!

Changes in IBIS 7.2

❑ **Technical Changes**

  – BIRD211.4 IBIS AMI Reference Flow Improvements

  – BIRD213.1 Extending IBIS-AMI for PAMn Analysis

  – BIRD217 Require Clocked Rx Models to Return Clock Times

❑ **Clarifications**

  – BIRD219.1 AMI Parameter Root Name Clarifications

  – BIRD221 AMI_parameters_in Clarification

  – BIRD222 Clock Times Clarifications

❑ **Other**

  – BIRD216 Alphanumeric Pin Names

 – BIRD218 Designator Pin List Relaxation

Visit https://ibis.org/birds/ for complete text

Reference Flow Changes

❑ Repeater (viz. Redriver) flows have been clarified

– Changes to the pre-Redriver channel response and the Redriver device itself should appear at the final Rx device during AMI_Init

– Defines new reserved parameter **Tx_Impulse_Input** to identify what the AMI_Init impulse response includes
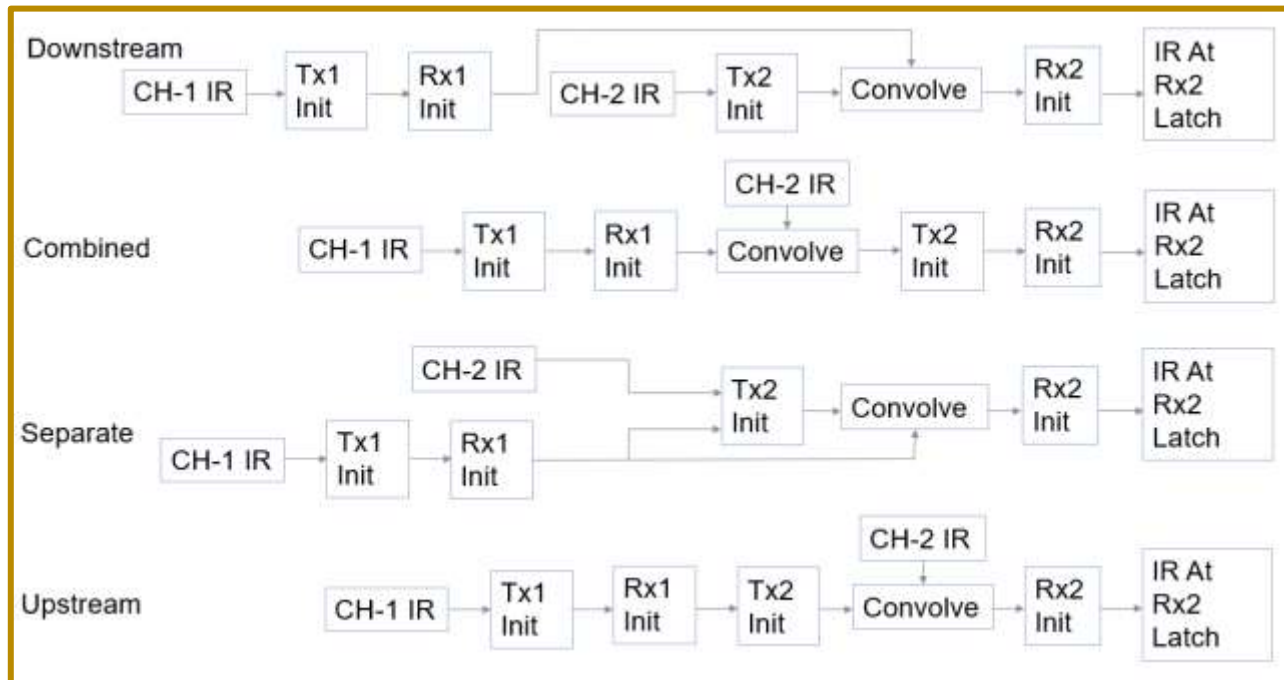
PAMn
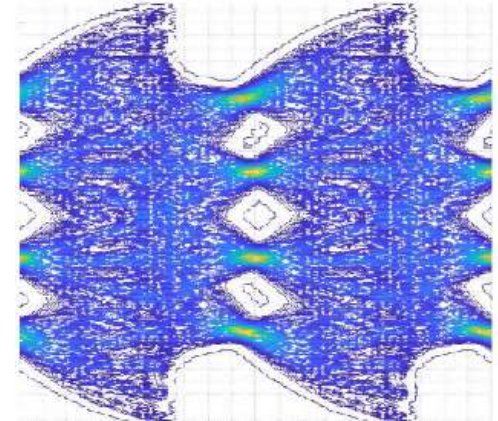
- ❏ **IBIS 7.1 supports PAM4**
  - Four independent signaling levels in the same bit-time
  - For context, NRZ is "PAM2"

- ❏ **PAMn is the general case, to help future-proof IBIS**
  - USB 4.0 targets PAM3; other PAM variations are likely in future

- ❏ **The changes in IBIS 7.2 support older PAM4 parameters for backwards-compatibility while creating expanded alternatives**
  - New parameters Modulation_Levels, PAM_Thresholds, and PAM_Offsets
  - Thresholds indicate voltage levels for symbols, while offsets modify sampling
  - Thresholds and Offsets are **outputs** from the RX model to the EDA tool

IBIS 7.2 generalizes PAM for an unbounded number of levels

Clocked Model Changes

- IBIS 7.1 introduced clocked AMI models
  - Intended for single-ended (DDR) support
  - Defines clock AMI models and supports using clock information to latch data into models in the same simulation
 - In 7.2, these clock models must provide clock time outputs
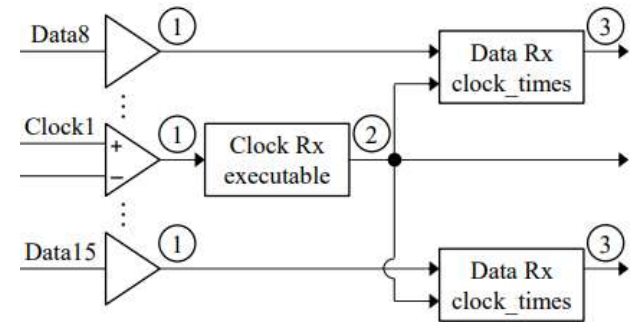
- Ambiguities in IBIS 7.1 clarified in 7.2
  - The clock_times argument of AMI_GetWave can actually be an output or an input
    - *As an input, Wave or Times may be used as specified in Rx_Use_Clock_Input*

IBIS 7.2 adds significant detail to clocked AMI approach

Other Clarifications and Improvements

- Root Names in AMI files and executables shall match

(my_rx_model …	⟷	(my_rx_model (…

  rx.ami   rx.dll/.so output to tool
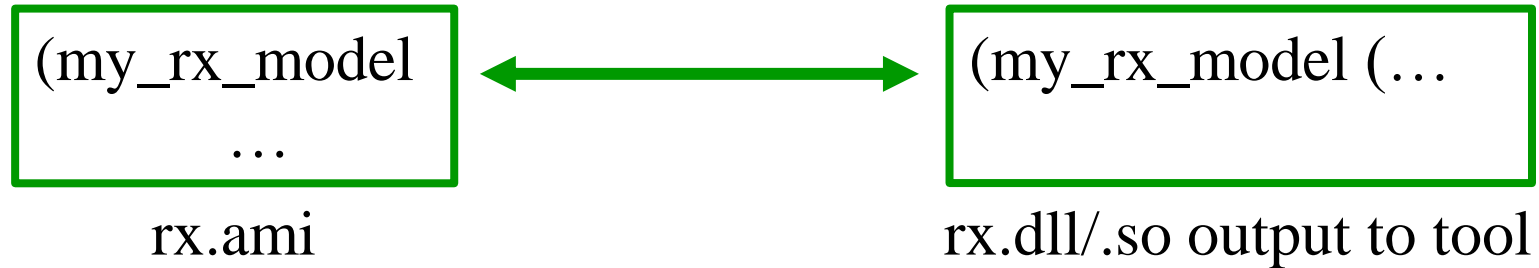
- Tools should pass Usage In and InOut parameters/values to models (not all parameters)
- [Pin] names are only alphanumeric
- EMD [Designator Pin List]s need not list every pin on a component

> … plus numerous minor grammatical and typographical improvements

Summary

- IBIS 7.2 has been approved as of January 27, 2023
  - … after just under six months of draft development

- Eight BIRDs included
  - First of these (BIRD211) submitted March 21, 2021
  - Last of these (BIRD222) approved December 9, 2022 (628 days)

- Next step: IBISCHK7, Version 7.2.0

Many thanks to the IBIS Editorial Task Group and the IBIS community for their fast work and active support!