Backchannel Revisited

Ken Willis
Ambrish Varma

DesignCon IBIS Summit
Santa Clara, CA
January 30, 2015

cadence®

Outline

- The Purpose of IBIS
  - Device Model that models the hardware/reality
- Where did we start?
- What did we have?
- Where we are/ What got added
- Where do we want to go?
- Discussion

The Purpose of IBIS

IBIS Version 6.0

2 STATEMENT OF INTENT

In order to enable an industry standard method to electronically transport IBIS modeling data between semiconductor vendors, EDA tool vendors, and end customers, this template is proposed. The intention of this template is to specify a consistent format that can be parsed by software, allowing EDA tool vendors to derive models compatible with their own products.

One goal of this template is to represent the current state of IBIS data, while allowing a growth path to more complex models/methods (when deemed appropriate). This would be accomplished

Finally, this template is meant to contain a complete description of the I/O elements on an entire component. Consequently, several models will need to be defined in each file, as well as a table

customers to use and modify, while ensuring that it is rigid enough for EDA tool vendors to write reliable parsers.

Finally, this template is meant to contain a complete description of the I/O elements on an entire component. Consequently, several models will need to be defined in each file, as well as a table that equates the appropriate buffer to the correct pin and signal name.

Modeling of Active Devices

EDA Tool Specification

cadence

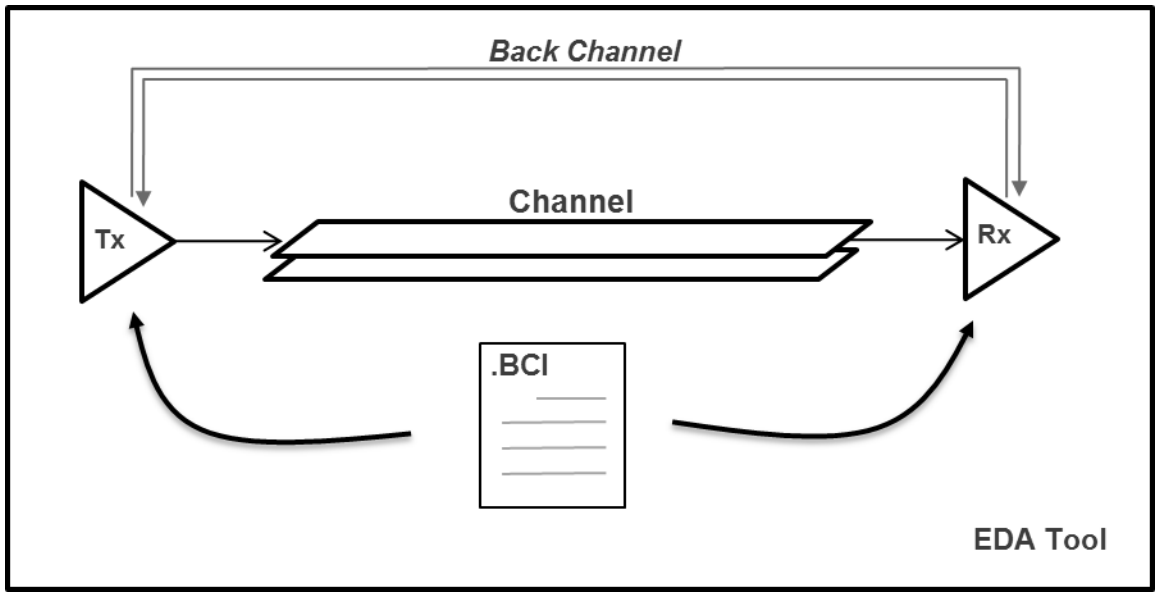
Where did we start?

- Scenario 1
  - Hardware Emulation. Model the backchannel that is specified in the Industry Protocol.
    - Smarts inside the AMI model
    - Time Domain, Getwave based
- Scenario 2
  - Co-optimization that does not mimic hardware optimization
  - Good to obtain a starting point for Getwave based TD simulation
    - Smarts inside the AMI model
    - Init based

✓ Tx and Rx AMI models remain “black box” entities
- Can evolve as industry needs, without an (annual) IBIS spec uprev

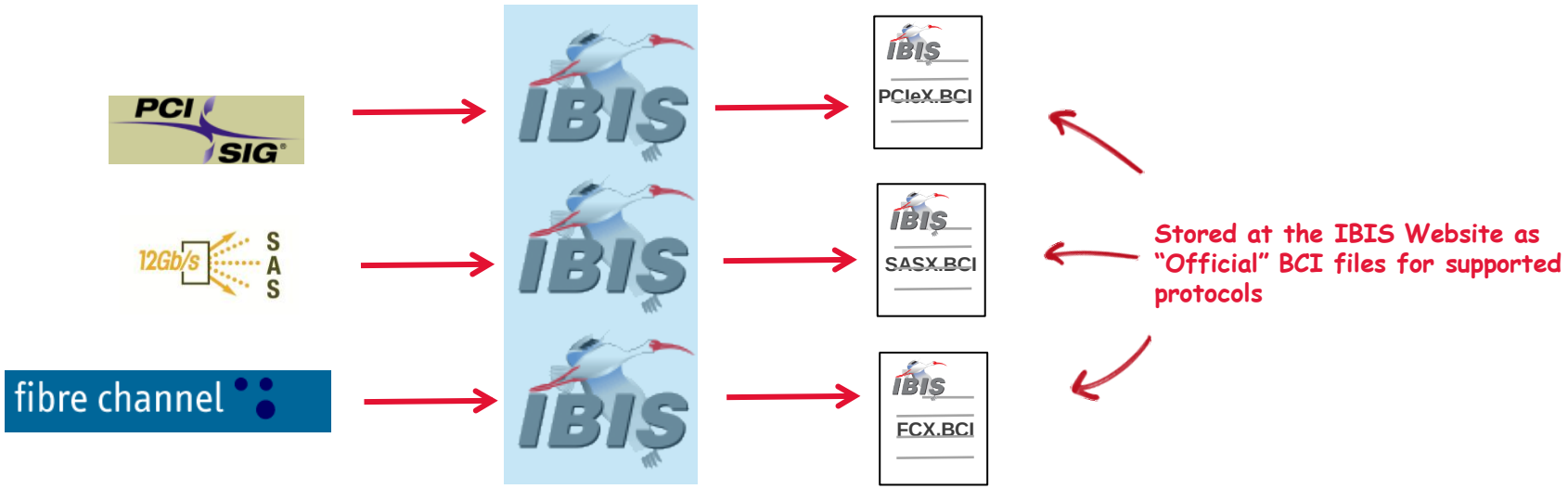
✓ Minimal involvement of the EDA tool
- The role of the EDA tool is simply to pass parameters back and forth between Tx and Rx
- Has knowledge of which Scenario is being used.

What did we have?



- Just two new Reserved_Parameters needed for AMI models:
  - Training > turns backchannel training on/off
  - Backchannel_Protocol > pointer to the specific BCI file being used
- BCI file contains protocol-specific info:
  - Training pattern and length
  - Min number of Tx taps available for training

The BCI File – Who, Why and When



- 'IBIS Approved' BCI Files will be produced every time there is a need/demand of supporting a new BC protocol
- Eliminate any interpretation errors between what is supported and what gets implemented by the Tx/Rx/EDA tools
  - The model makers otherwise will have to read relevant sections of the protocols to understand, interpret and implement the BC communication.

‘Private’ BCI File

- Company A can make a ‘private’ .BCI file and send it to Company B to disclose what/how the Backchannel interaction is performed for their Tx/Rx.
  - Convenient, wholly contained
  - Separate from .AMI
  - Works in the same fashion as published protocol Backchannel training.
  - EDA tool does not need to do anything different for private .BCI.

Where we are/ What got added

- Scenario 1
  - Hardware Emulation. Model the backchannel that is specified in the Industry Protocol.
    - Time Domain, Getwave based
- Scenario 2
  - Co-optimization that does not mimic hardware optimization
  - Good to obtain a starting point for Getwave based TD simulation
    - Init based.
- Scenario 3
  - Use Legacy Tx/Rx AMI model

Issues and Concerns with Scenario 3

- The EDA tool will need to actively participate in the optimization process to enable co-optimization between legacy Tx and/or Rx.
  - This will introduce many Reserved and Model Specific Parameters
  - Nice to have but will be extremely costly/time consuming to iron out and implement.
  - Is scenario 3 as important as scenarios 1 and 2?

- **This will produce varying results between different EDA tools for the same AMI models.**
  - **Which EDA tool will be the "standard"?**

- Are we crossing the line into EDA tool specification instead of I/O specification?
- Can we guarantee that no legacy Tx/Rx AMI model will need to be recompiled?

Legacy Support

MICROSOFT WINDOWS

Legacy Support

- Backchannel Co-Optimization is a forward looking upgrade to AMI

Where do we want to go?

- We can get mired in discussing obsolete issues that are nice to have but costly to implement and maintain

Or

- We can move forward with the things the industry needs relatively quickly.

- We have a well defined BIRD 147 that satisfies everything that scenarios 1 and 2 require.

Note: IBIS is a spec for modeling active devices. It is important we don't blur the line between that and an EDA tool specification.


cadence®