IBIS Modeling for Load Dependent Current Mode Differential Drivers

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Outlines

- Load Dependent Current Mode Differential Driver
- IBIS Extraction Method
- What IBIS is missing
- Summary
Load Dependent Current Mode Differential Driver
Load Dependent Current Mode
Differential Driver (Current Flow)

External Differential load is required to have active current source
IBIS Extraction Method (Modeling as 2 individual pins)

No load to be used for I-V curve extraction

Figure 3.1 – Standard 3-state Buffer (Pulldown I-V Table Extraction Shown)
IBIS Extraction Method (Modeling as 2 individual pins)

Load connected to GND or VCC to be used for V-T curve extraction

Figure 3.2 – Simulation Setup for Extracting Ramp Rate Information (Rising Edge Shown)

Pictures from IBIS cookbook
Using normal extraction methods for I-V and V-T curves

* I-V curves shown are combined curves and load line using reference to GND

Correlation shown they are way off from the Spice result
RED – Spice, BLUE - IBIS
Using enhanced extraction method with differential load

* I-V curves shown are combined curves and load line using reference to GND

I-V

Correlation shown matched result with Spice
RED – SPICE, BLUE - IBIS

V-T

Common mode
0.5v

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Summary

- Differential load dependent current mode differential pair buffer cannot use normal extraction method to model IBIS.
- Enhanced method considered differential load can solve this issue. It gives the matched results when correlating with Spice simulation results.
- It would be better to have IBIS Spec accepts “Rref_diff/Cref_diff” kind of differential loads for regular IBIS differential pair models.
  - Rref_diff/Cref_diff is limited for External model use now.
- IBIS Spec needs to be enhanced when modeling dynamic PLL current mode buffer.
  - Various I-V tables for different diff_loads.
  - Current dependent C-comp value table.