

C_comp Model Using IBIS- ISS or Touchstone

Introduction to the BIRD

Randy Wolff

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BIRD Overview

- This BIRD enhances IBIS to allow an alternative C_comp model using an IBIS-ISS subcircuit or Touchstone file.
- Proposed changes
 - [C_comp Model], new keyword
 - [C Comp Corner], modified to be required when using [C_comp Model]. [C_comp Corner] will be used for K-t curve generation.
 - [Component], modified Si_location & Timing_location sub-params (modified from BIRD191.2). The “Die” location refers to the Buffer_I* terminal(s) of a [C_comp Model] if [C_comp Model] is present.

[C_comp Model] Keyword Sub-parameters

- Mode
 - Driving, Non-Driving, or All
 - Up to two C_comp Models may be defined, one for Driving mode and one for Non-driving mode.
 - May cause issues with dynamic switching of [Model] from Input to Output modes during simulation
- Param
 - Value or Corner parameter can be passed into an IBIS-ISS subcircuit
- File_IBIS-ISS
 - 1-3 files/subcircuits to cover Typ/Min/Max corners
- File_TS
 - 1-3 files to cover Typ/Min/Max corners

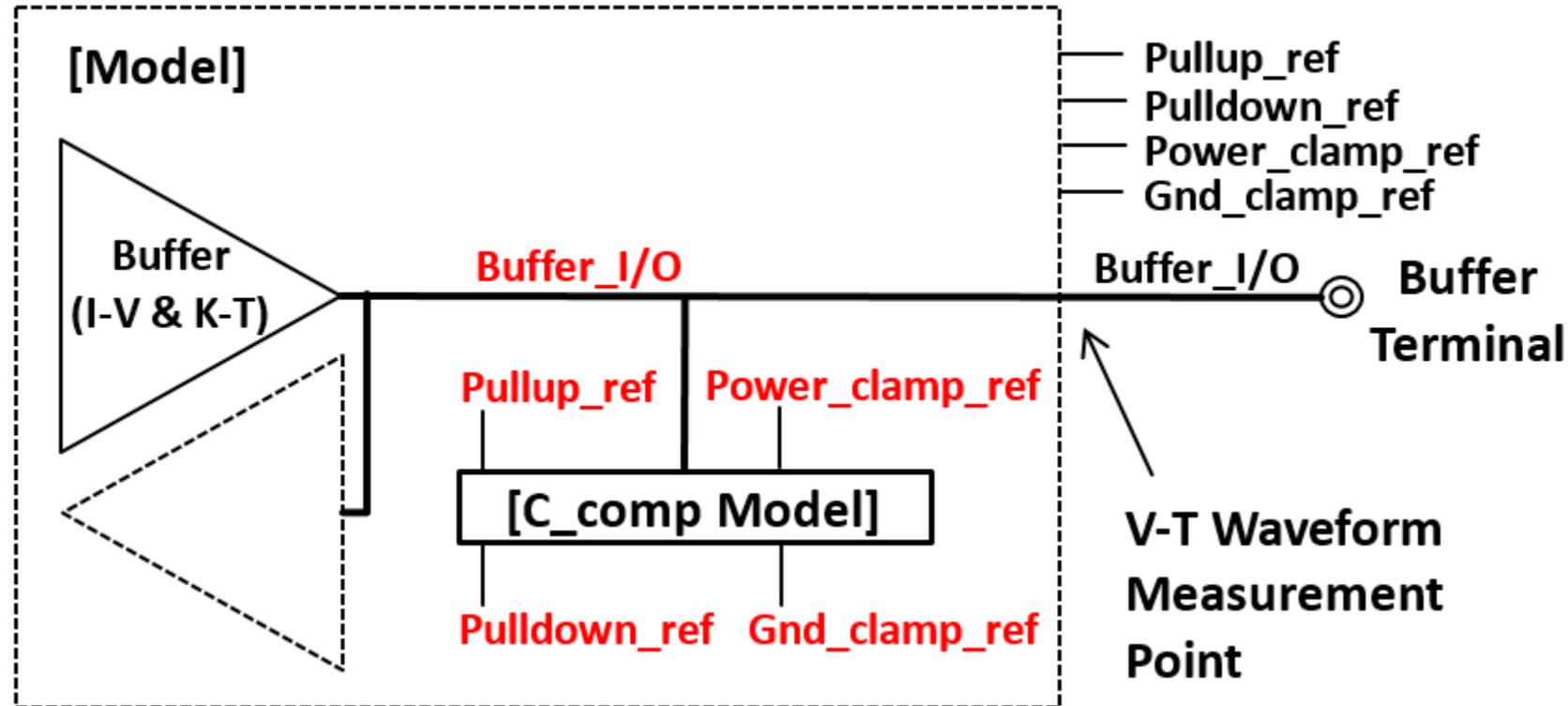
[C_comp Model] Keyword Sub-parameters

- Number_of_terminals
 - Matches the number of terminals used in an associated IBIS-ISS subcircuit or the number of ports plus 1 (N+1) used in a corresponding Touchstone file.

- Terminal lines
 - Each terminal line contains information on a terminal of an IBIS-ISS subcircuit (or Touchstone file).
 - Two or more terminal lines may appear under a given [C_comp Model] keyword.
 - At least one signal and one reference terminal line is required.
 - Terminal lines are of the following form:
 - <Terminal_number> <Terminal_type>

C_comp Model

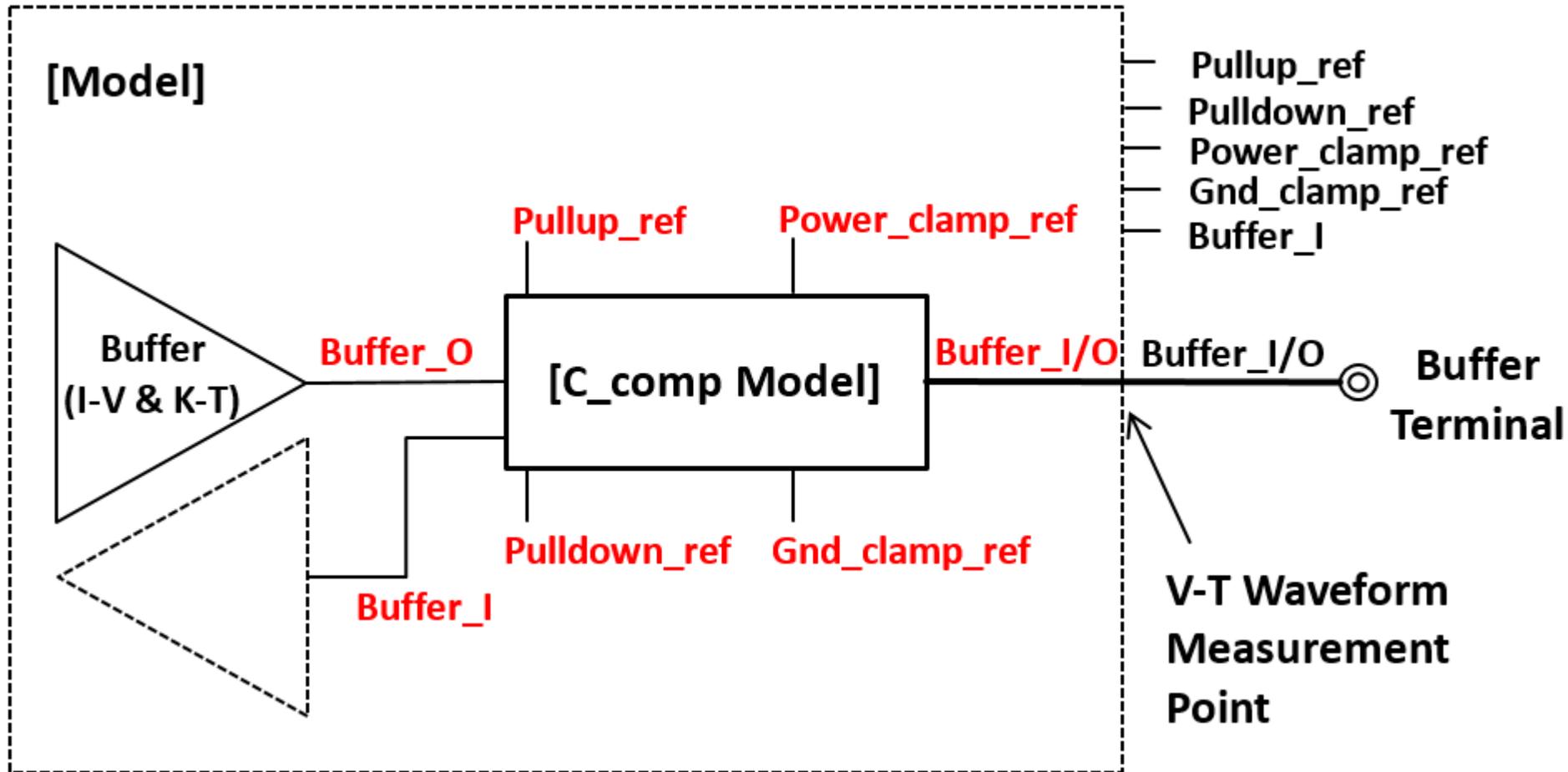
C_comp replacement with single terminal connection



Terminal_type
label for C_comp
Model terminals
highlighted in red.

C_comp Model

C_comp replacement with a model containing series elements



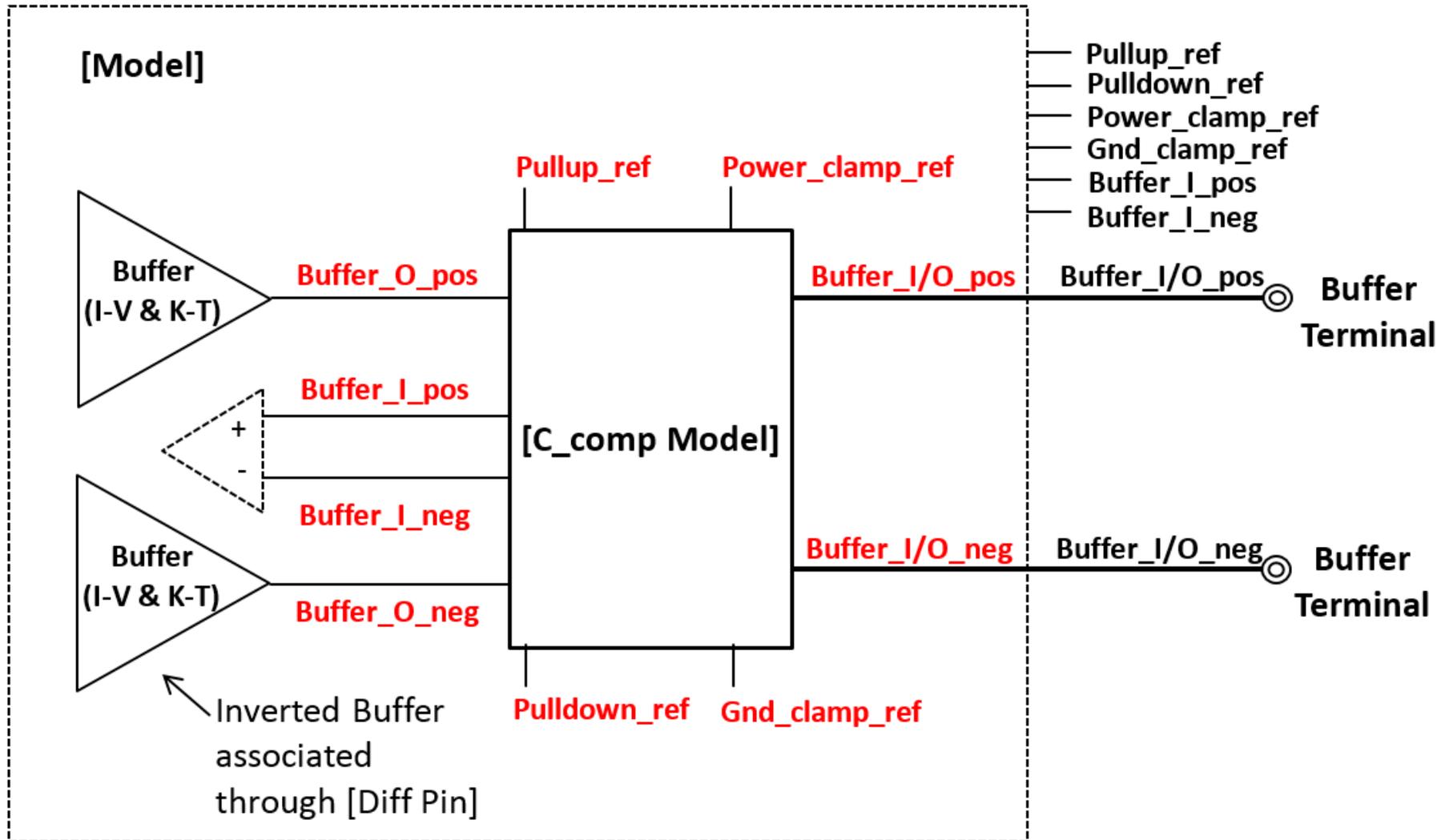
Series elements within a buffer:

1. Input buffer isolation/filtering (between Buffer_I/O and Buffer_I)
2. Buffer-level interconnect not modeled as on-die interconnect with BIRD189 syntax (between Buffer_I/O and Buffer_O)

Terminal_type label for C_comp Model terminals highlighted in red.

C_comp Model

C_comp model for differential buffers associated through [Diff Pin]



This C_comp Model would allow direct RLC connections between buffer [Model]s, allowing for true differential buffer models.

1. Is this desired?
2. The inverted buffer would have to use the same [Model].

Terminal_type label for C_comp Model terminals highlighted in red.

Issues to Discuss

- Reference requirements
 - Should A_gnd be an allowed reference?
- Differential C_comp Models
 - Pseudo-differential buffers typically have limited interaction except at the input buffer, so differential capacitance modeling is not needed.
 - Would the C_comp Model be used to create true-differential buffer models that will not work in practice?
- C_comp compensation algorithms
 - Does the requirement of including [C Comp Corner] give sufficient information for EDA software algorithms?
- Separate Input and Output C_comp Models
 - Will cause problems with Enable/Disable simulation of I/O buffers.

