Alternatives in IBIS Ground Issues

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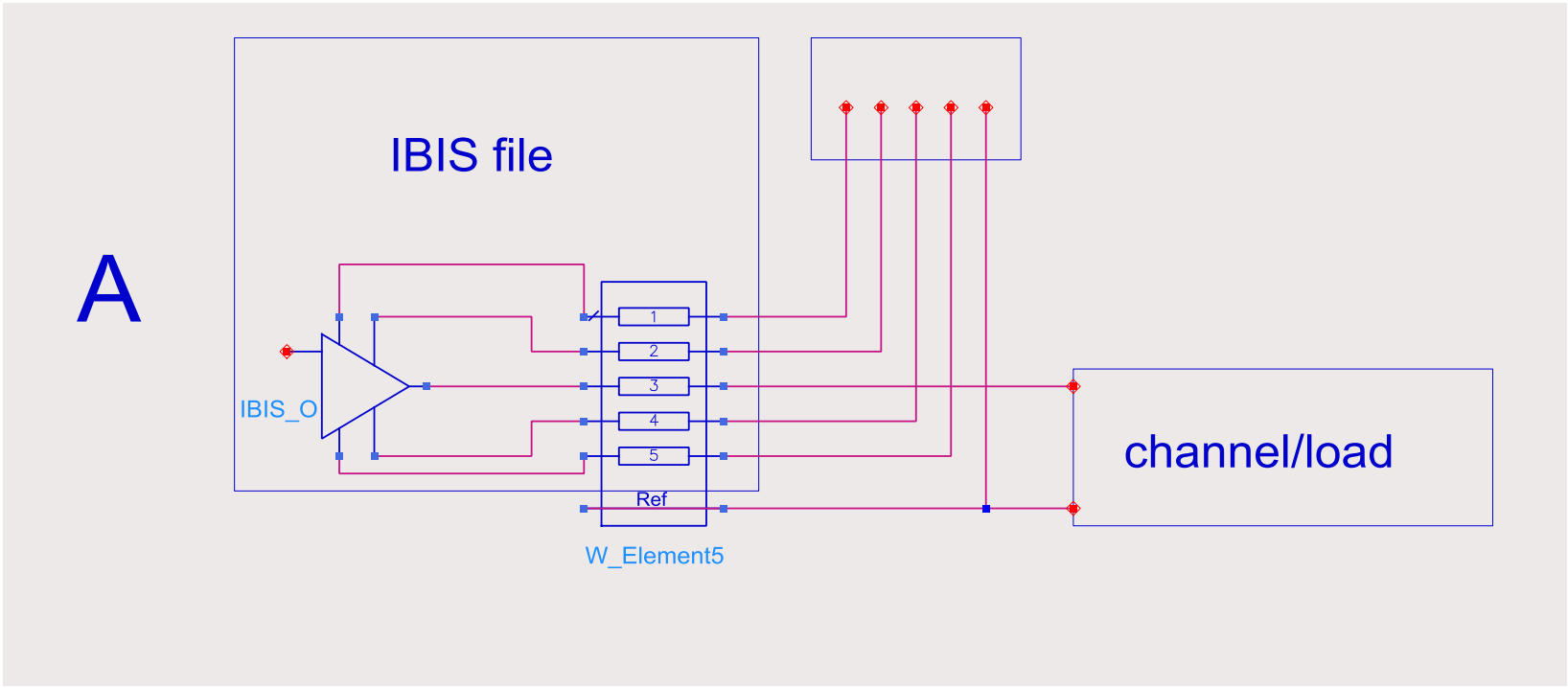
Legacy IBIS



The Ref rail represented 0.0 V, though in simulation it did not have to be connected to node 0 – “GND” instead of the ground symbol was better.

Answer to power supply chicken and egg question: GND was first.

The Ref (or GND) rail was the signal reference as well.

Legacy IBIS “GND” Issues

The presence of the node GND was not formally explained in the spec but power or ground bounce simulation was facilitated by the separation of xxx_ref terminals form the ideal power supply with respect to GND.

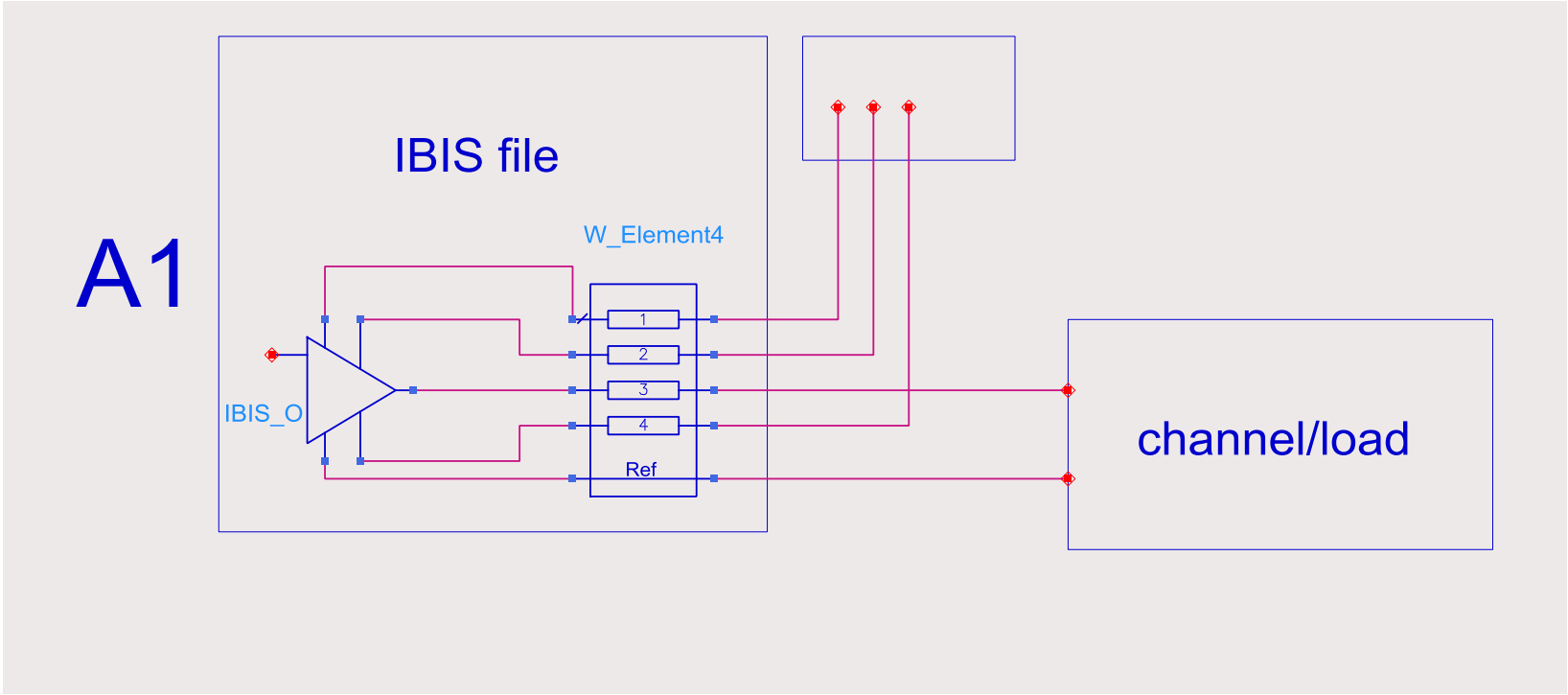
The identification of the reference terminal for the output signal port is essential, and has been considered to be GND.

Either R/L/C pkg (or pin) or [Define Package Model], as well as C_comp, were defined implicitly with respect to GND. There were no means to identify this precisely when the power supply voltages were subject to fluctuations.

Both R/L/C pkg (or pin) and [Define Package Model] provide capacitance values/matrices that will lead to inconsistent simulation results if not connected properly.

The above is not an issue in non-power-aware simulations. Freeing the GND from the global ground allows the GND nodes of multiple buffers to be different, if desired by the user.

Legacy IBIS – coinciding rails



Case A is a superset. The rails sharing the same [xxx Reference] values collapse to common rails.

The above picture shows the case of [Pulldown Reference] of zero with all other [xxx Reference] values different from zero and from each other.

Legacy IBIS – what's missing

Case A1 does not seem to be controversial. In this example, the definition of the reference node for the signal output port being that of the GND node, now coinciding with the Pulldown_ref seems to be commonly acceptable.

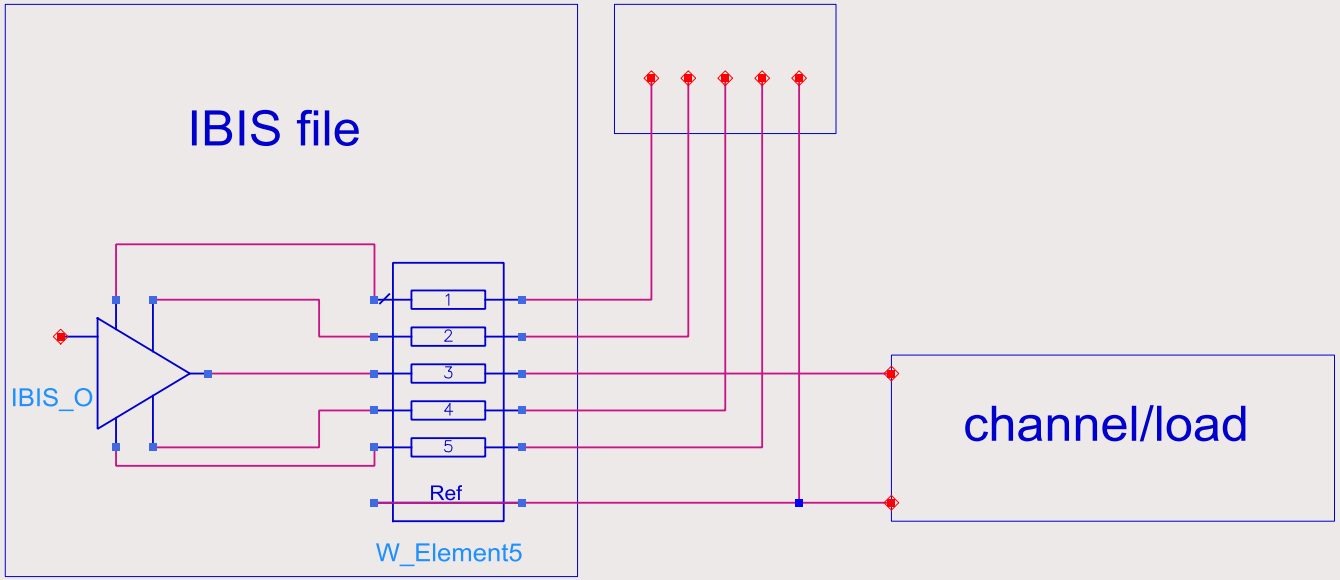
However this may be expanded. It may make sense to collapse the Ref rail to a rail corresponding to a non-zero [xxx Reference] – for example VCC in PECL.

When all [xxx Reference] keywords are different from zero there is clear ambiguity in the simulation model except for perfect biasing consistent with the [xxx Reference] values and the GND reference.

But for any simulation – power aware or not - it should be very clear how the signal I/O port is defined (the pair of I/O terminal and the reference node) – this is something we want to clarify.

Preferred Solution

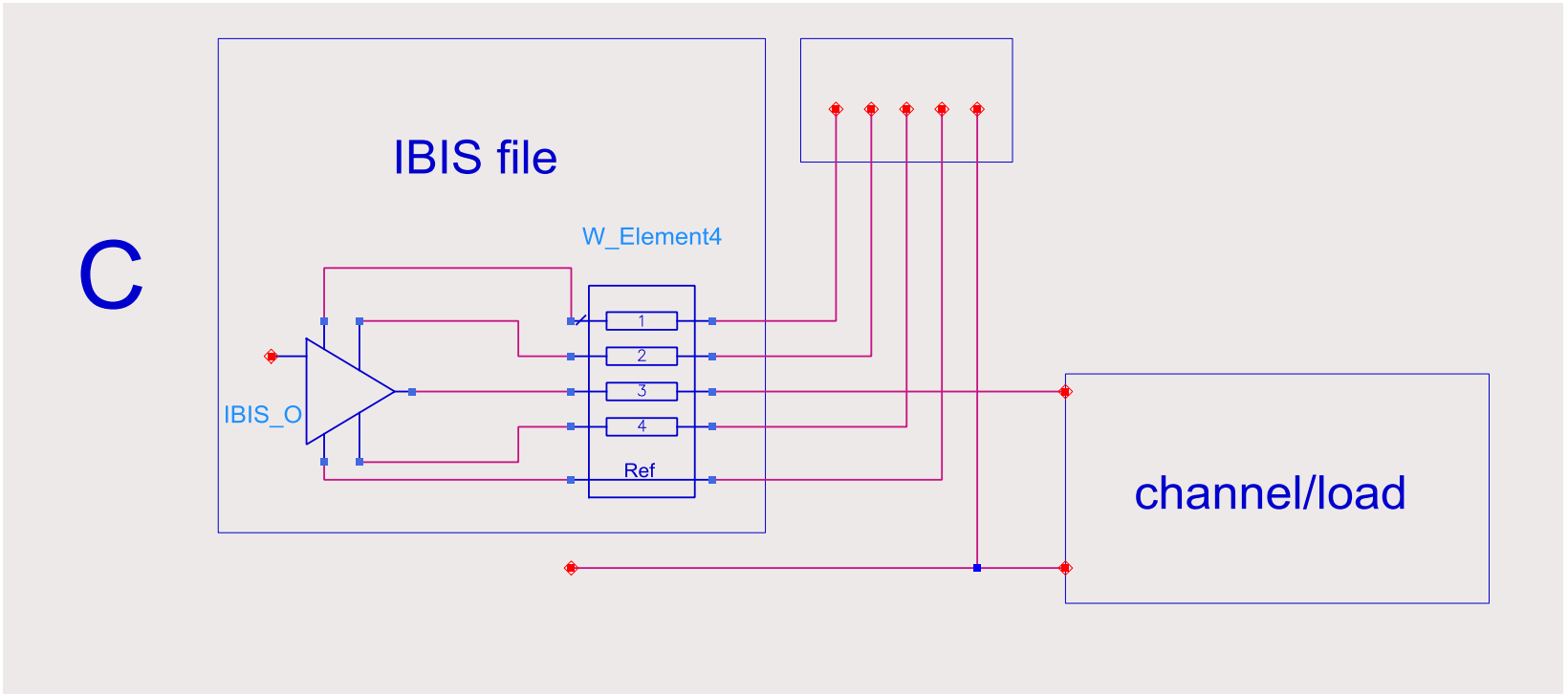
B



Here, the reference node is one of the pins of the component. The previously proposed [Pin Reference] keyword could facilitate this and provide means for the model makers to identify it (optionally).

A proper handling of the collapsing could be handled by the other proposal (DUT_ref_terminal) or by defining [GND Reference] keyword (zero by default, guaranteeing backward compatibility).

Floating Buffer – do we really want this?



This was suggested as a valid case during our July 26th ATM meeting.

Here, the Ref rail is no longer the signal I/O reference node. The I/O reference node would be entirely defined outside of the IBIS model via the on-board couplings.