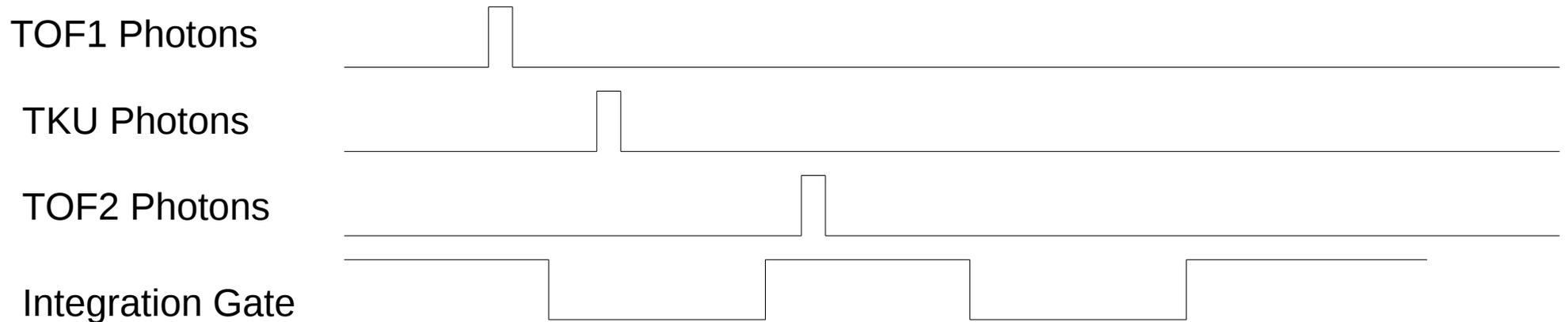


Tracker timing in the prescaled trigger

The constraints,
a possible solution and
more diagnostics...

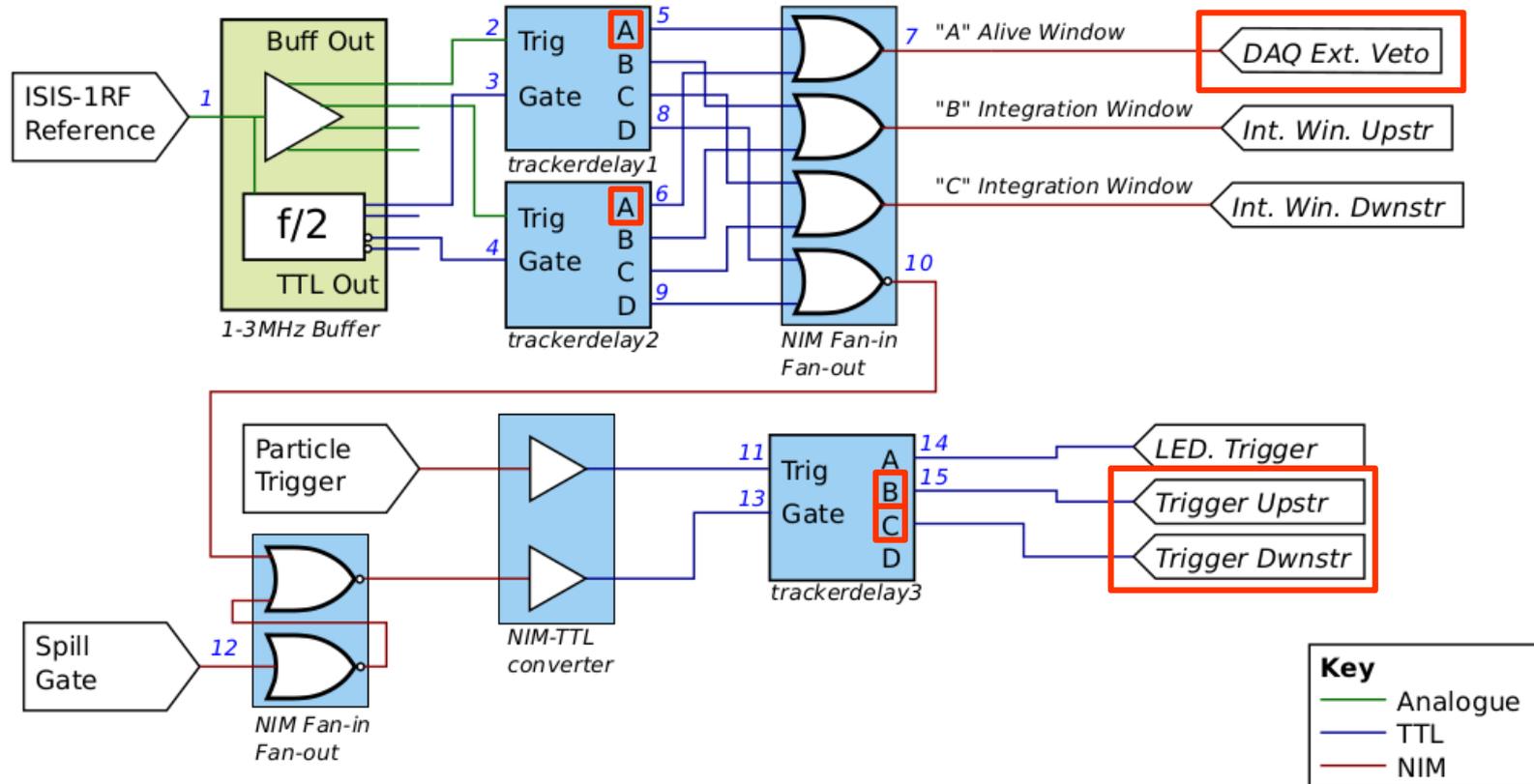
E. Overton

Front end (in hall) timing



- Tracker is only able to accept charge arriving inside the integration gate.
- Integration gate is synchronised to MICE particles using the ISIS RF.
 - Therefore does not change dependent on trigger.
- Hit times are checked against “alive window” in rack room, to verify the front end electronics were in use
- Hits from TOF1/2 are delayed due to particle TOF.
 - Triggers from TOF2 are delayed WRT the fixed timing of the integration gate.
 - Need to factor these changes in when swapping between triggers.

Current implementation



Indicates a parameter which needs changing for TOF 0,1,2 trigger conditions

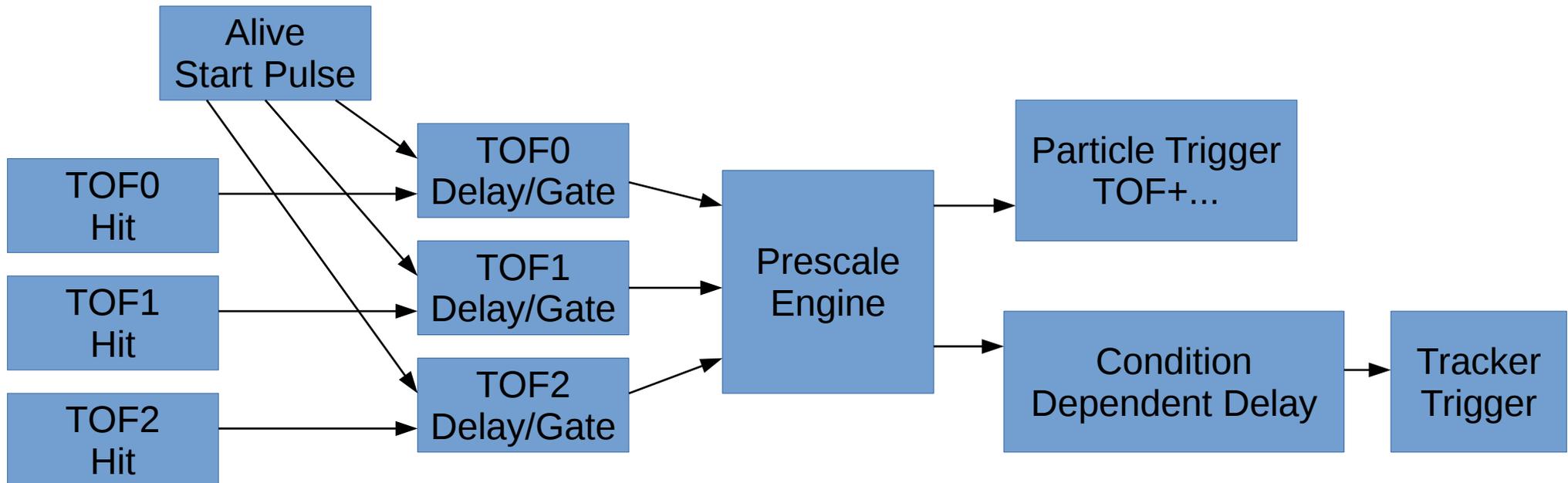
- Note that the programmable delay units cannot be changed within a spill timescale and for a prescaled trigger would be essentially fixed.

Prescaled trigger

- Would need to implement all variable timing elements within trigger logic.

Possible plan:

- Use existing “Alive Window” signal to generate a alive start pulse, synchronised to ISIS-1RF.
- From alive start pulse implement 3 gates internal to trigger, one for each TOF detector. Each gate has independent timing configuration.
- From the engine, need to apply condition sensitive delay to fix “tracker trigger” timing.



Taking advantage

-
- Also possible to include extended diagnostics in trigger logic.
 - Could record time (in 10ns bins) for each accepted trigger. Enables shorter tuning and have record for future analysis.
- Could reduce tracker dependent electronics:
 - May be possible to also generate integration gates inside trigger.
 - Could again generate LED triggers inside trigger.
 - Easy to preserve all timing configuration with DAQ data.
 - Less components to fail

The Cost

- The logic is reasonably simple to make.
- Some thought may be required with the “Condition Dependent Delay” step.
- The real cost will be in the configuring/testing of the system.
 - Multiple delays/gates need tuning.
 - Need to understand interplay between conditions.
 - True test of system requires beam and validation time.
 - Building a complex system, implies we will need more than we think, to understand “features”.
- Hence, Improving diagnostics from the trigger is essential!