

ModSim & Ultra-DPS

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Preliminary Results

- Ultra DPS looks promising
- Reasonable agreement with David
 - We were not really trying to duplicate the results per se
- Some interesting features noted
- Some improvements in modeling to come

Assumptions

- We assumed the 'new baseline'
 - 2 SRC's (8 bit)
 - Advertised L2P improvements
 - Corresponds to study '3b' 2 weeks ago
 - SVT as it is currently (160441)
- 80 kHz L1A input
 - 70 kHz component 'prescaled'
 - Tried $n \geq 2, 3$ and 4 EMPTY L2 buffers
 - 10 kHz component requires $n \geq 1$

ModSim Studies

Scenario 3b						
EMPTY Buffers			Unprescaled	'Prescaled'	Deadtime	L2A
			L1A input	L1A	(%)	(Hz)
			(kHz)	(kHz)		
	>=1	no DPS	10	NA	0.67	320
	>=1	no DPS	15	NA	1.5	290
	>=1	no DPS	20	NA	2.8	300
	>=2	Ultra-DPS	80	41	7.3	150
			(10::70)			
	>=3	Ultra-DPS	80	33	1.6	110
			(10::70)			
	>=3	Ultra-DPS	80	32	1.9	240
			(10::70)			
	>=3	Ultra-DPS	80	31	1.9	350
			(10::70)			

Interesting Consequence

- With Ultra-DPS enabled:
 - $CDF_L1A/FRED_L1A > Livetime/Runtime$
- This should NOT be a surprise
 - Ultra-DPS breaks the random nature of the trigger selection such that triggers are sent to the DAQ system (the TS) preferentially when the system is `live`.
- Not an issue: we do not use the ratio of L1A's (above) to determine the `live' luminosity
 - We check each BC for ≥ 1 EMPTY L2 buffer

Some Remaining Issues

- Current simulation has no `trigger table`
 - Same L2 rejection ratio for both components
 - Based on L2A target rate/unprescaled L1A rate
 - But L2A rate and Readout Deadtime small
- Current simulation does not take into account any effects due to hardware implementation
 - Expect a $\sim 2 \mu\text{sec}$ delay in feedback of buffer status information from TS crate into FRED
 - At 100 kHz \rightarrow 20% chance for stale information
 - For $n \geq 3$ condition this should probably be OK

Conclusions

- David has made an inspired suggestion
- ModSim results look good so far
- Would like to complete our studies before taking the next step
- Extracting the feedback signal from the TS crate should not be a problem (firmware is in hand for an upgrade)
- The rest of the work is in the Trigger Table