PSD@CBM firmware description (draft, for internal use)

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Actual version of the document is avaliable at github:
`https://github.com/dfinogee/PSD-readout-manual/raw/main/PSD_readout_manual.pdf`

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1 ADC data processing

1.1 Channel data collecting

Each channel collect data in FIFO (chdata_fifo) in hit packet format and emit ready signal after data stored in fifo. Ready signal is syncronious to signal treshold crossing and used for event ADC timestamp fig. 3. Implemented in PSD_channel_calc.

Mean hit rate per channel = SYSCKL / total channels / packet lenght. SYSCKL = n * ADCclk = 240MHz; total channels = 32; packet lenght = 1. Max mean hit rate is 7.5 MHz.

fig. 2 Represents forming hit packet, should be reimplmented with fit procedure.

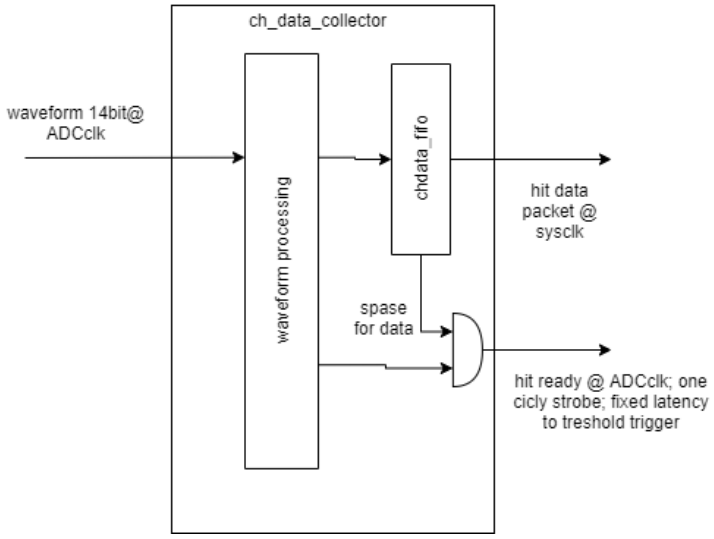

Figure 1: Channel data collecting scheme

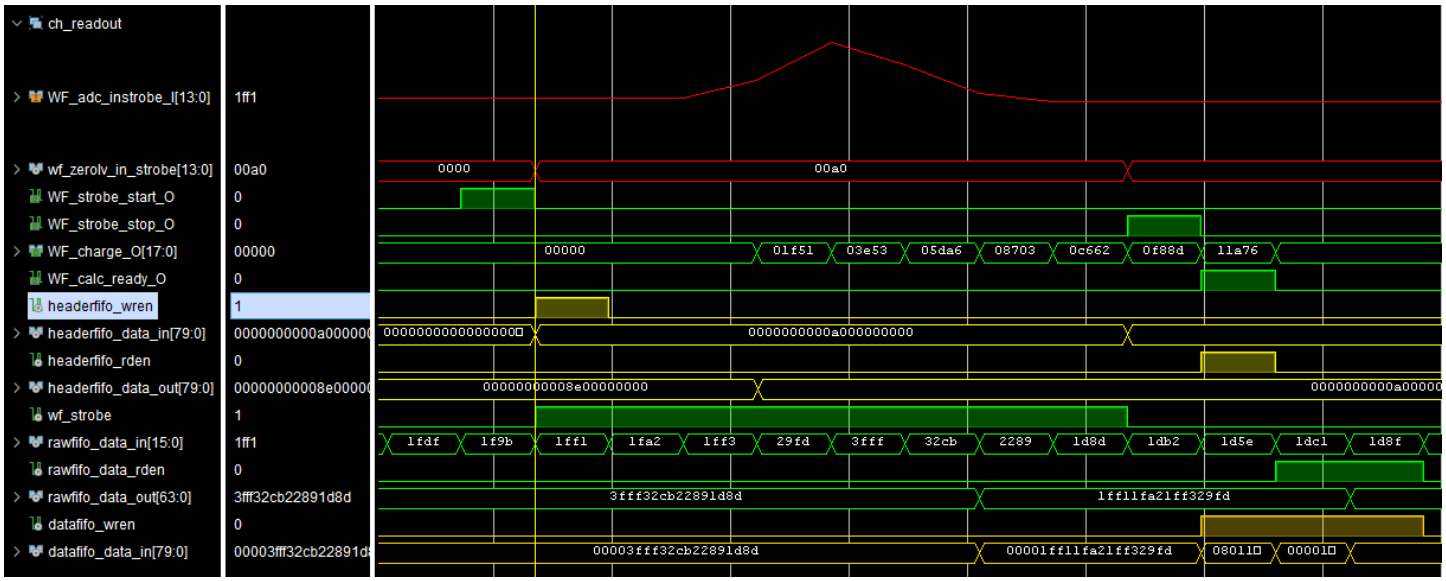

Figure 2: Channel data collecting waveform

word	79 .. 72	71 .. 64	63 .. 34	33 .. 16	15 .. 0
1	waveform points number	channel	0x0	signal charge	waveform zero level

Table 1: hit packet header.

word	79 .. 64	63 .. 48	47 .. 32	31 .. 16	15 .. 0
1	0x0	waveform point n	waveform point n+1	waveform point n+2	waveform point n+3

Table 2: hit packet data word.

todo: wf points num to data words num
todo: fit procedure implementing in waveform processing
todo: ch ready signal after packet pushed

1.2 Data collecting from channels fifo

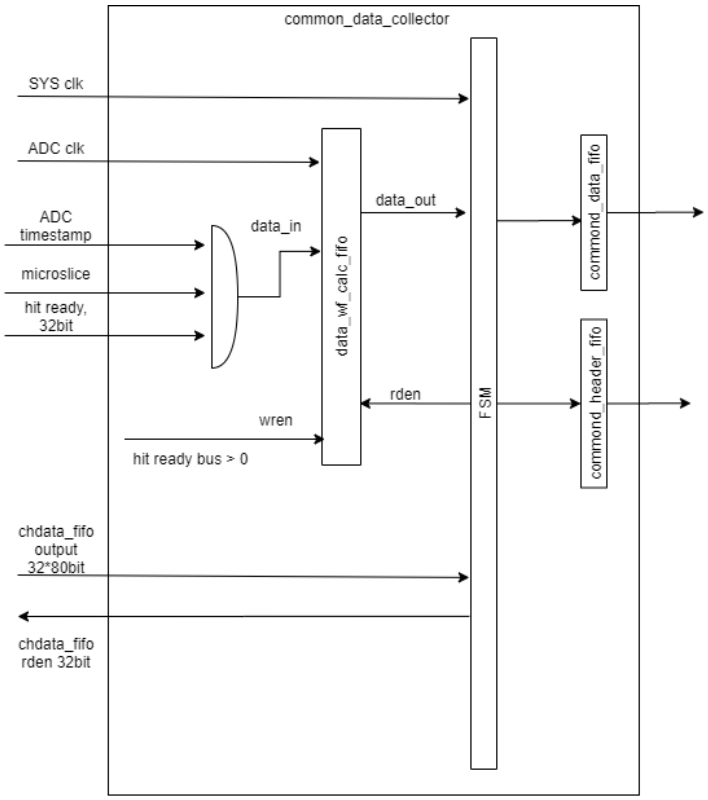

Figure 3: Data collecting scheme from all channels fifos