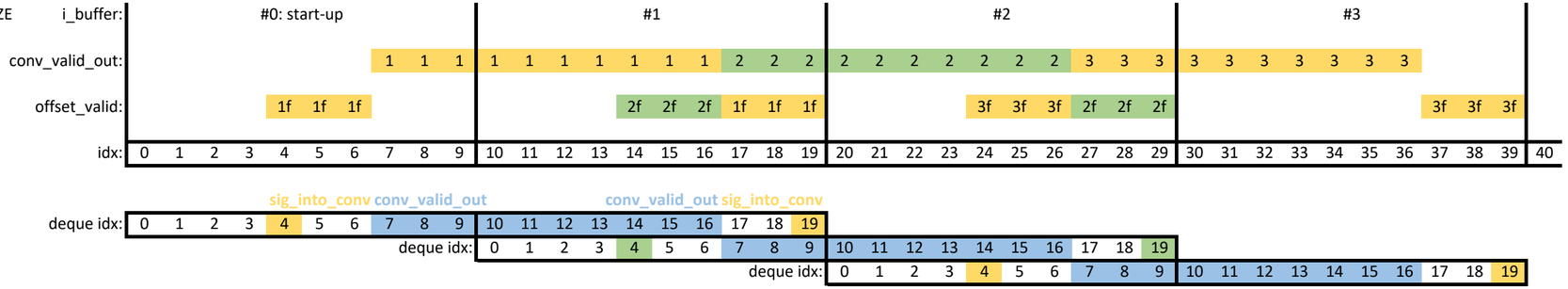
sig_filt = 'conv_valid_out' = convolve(b_firwin, sig_into_conv, mode='valid') Dennis van Gils, 23-01-2019

Test scenario 1:

Perform convolve every incoming buffer, deque buffer is 2x BUFFER_SIZE
Not optimal

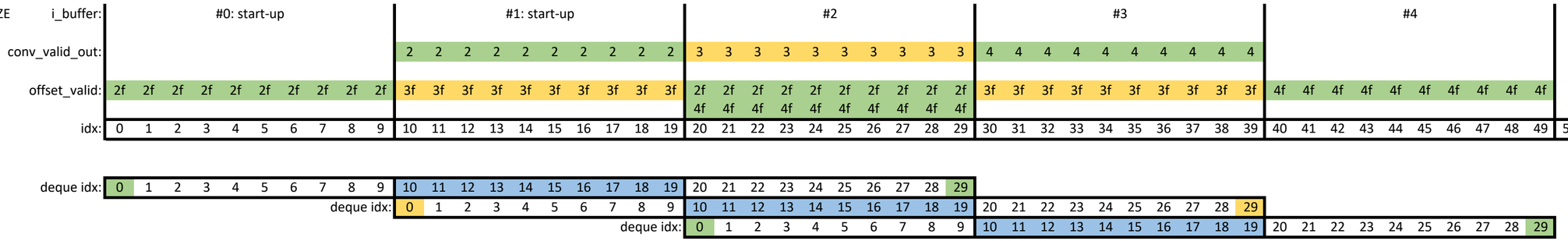
BUFFER_SIZE	10	samples	
N_buffers_in_deque	2	int	
N_deque	20	samples	
N_taps	7	samples	== must be odd number
N_sig_into_conv	16	samples	
offset_deque	4	samples	
N_conv_valid_out	10	samples	== BUFFER_SIZE
offset_valid	3	samples	
win_idx_valid_start	7	samples	



Test scenario 2:

Perform convolve every incoming buffer, deque buffer is 3x BUFFER_SIZE
Maximized N_taps given N_buffers_in_deque

BUFFER_SIZE	10	samples	
N_buffers_in_deque	3	int	
N_deque	30	samples	
N_taps	21	samples	== must be odd number
N_sig_into_conv	30	samples	
offset_deque	0	samples	
N_conv_valid_out	10	samples	== BUFFER_SIZE
offset_valid	10	samples	
win_idx_valid_start	10	samples	



Optimal scenario:

Perform convolve every incoming buffer, maximize N_taps given N_buffers_in_deque

Fs	10000	Hz	
BUFFER_SIZE	500	samples	
N_buffers_in_deque	81	int	
N_deque	40500	samples	= BUFFER_SIZE * N_buffers_in_deque
N_taps	40001	samples	= BUFFER_SIZE * (N_buffers_in_deque - 1) + 1 == max that fits using N_deque

Fred Harris' approximation — Multirate Signal Processing for Communication Systems, Fredric J. Harris, 2004, page 216, equation (8.16)

f_pass	49	Hz	
f_stop	50	Hz	
filter attenuation	88.00	dB	= N_taps * 22 * ((f_stop - f_pass) / Fs)

N_sig_into_conv	40500	samples	= BUFFER_SIZE + N_taps - 1 == N_deque by optimal design
offset_deque	0	samples	= N_deque - N_sig_into_conv == 0 by optimal design
N_conv_valid_out	500	samples	= N_deque - N_taps + 1 == BUFFER_SIZE by optimal design
offset_valid	20000	samples	= INT((N_taps - 1) / 2)
win_idx_valid_start	20000	samples	= offset_valid + offset_deque == offset_valid by optimal design
T_delay_valid_start	2.00	s	= win_idx_valid_start / Fs