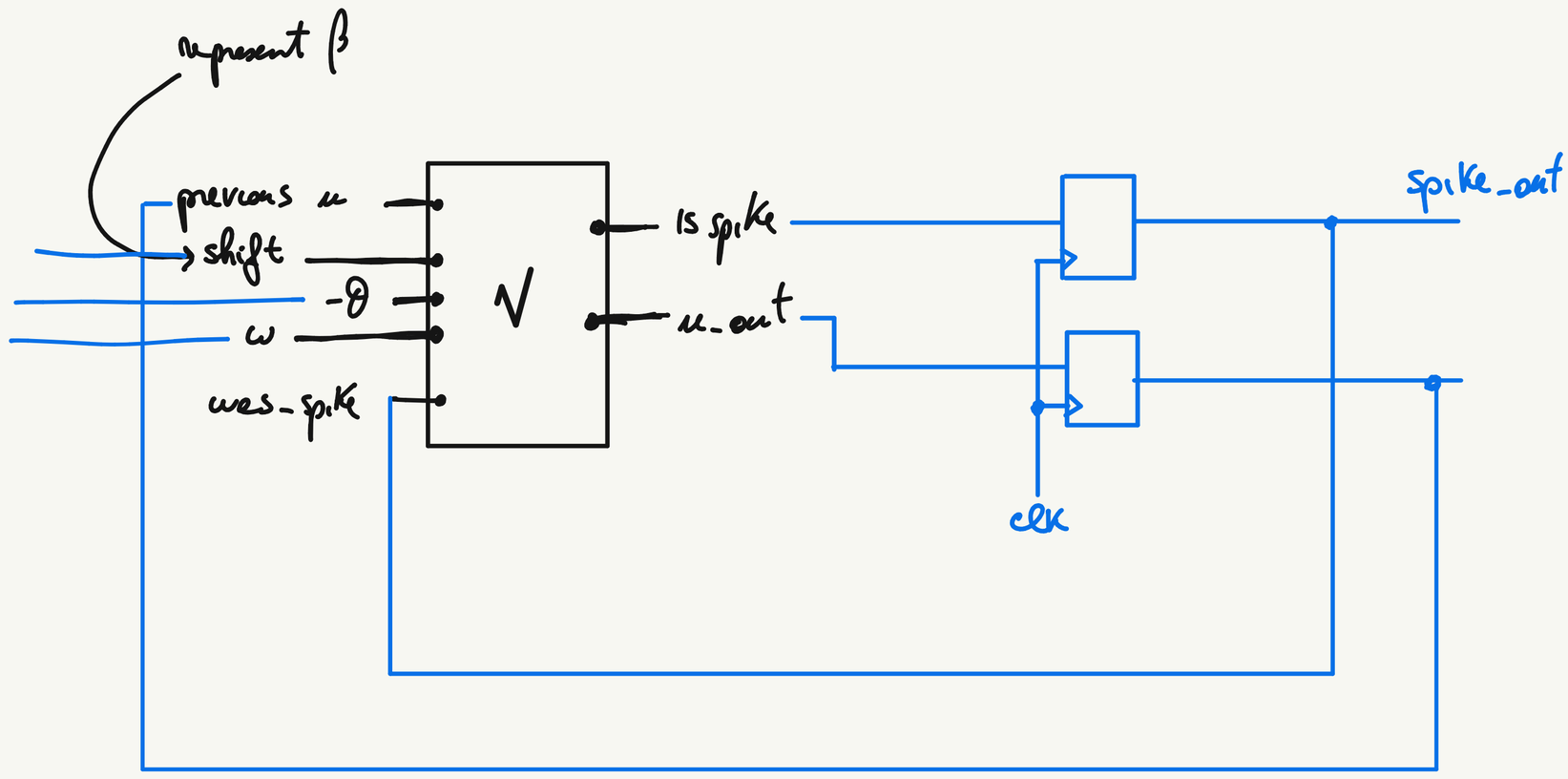
NN topology: case study: MNIST

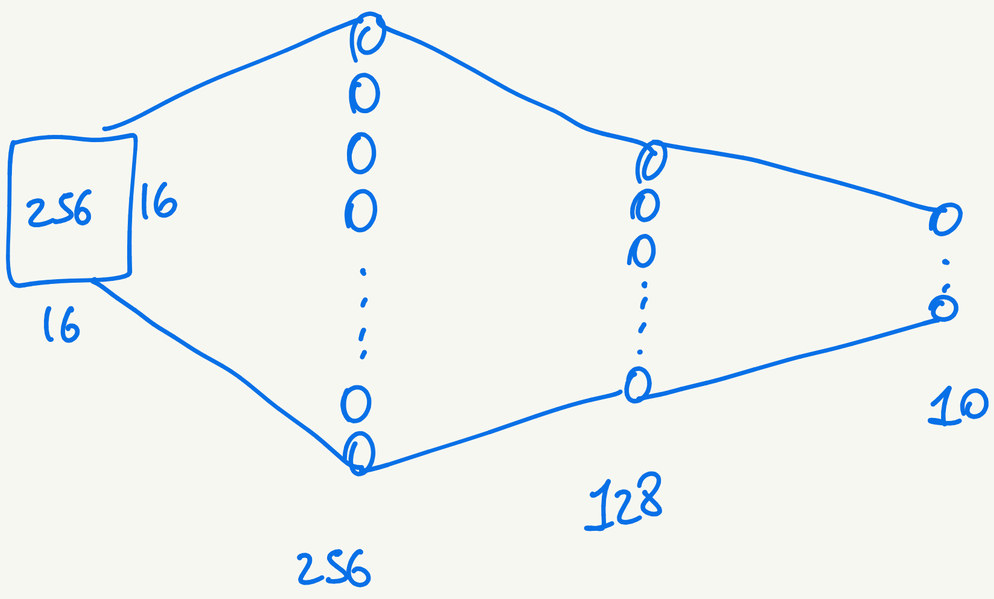
256 input

256 78% + BN

128 50% + BN

10 FC





$wx \cdot BN\_mult + BN\_addend$

BN_mult = 0.5 0.75 1 1.5 2 3 4 6 8 = 9 combination → 4 bits

$\frac{1}{2}+0$ $\frac{1}{2}+\frac{1}{4}$ 0+1 $\frac{1}{2}+1$ 2+0 2+1 0+4 2+4 8+0

0 → zero

$\frac{1}{4}$ → srl (2)

$\frac{1}{2}$ → srl (1)

1 → no shift

2 → sll (1)

4 → sll (2)

8 → sll (3)

BN_mult (3→2) (1→0)	1° shift	2° shift
00	0	0
01	1/2	1
10	2	1/4
11	8	4