Real-time Focus Peaking
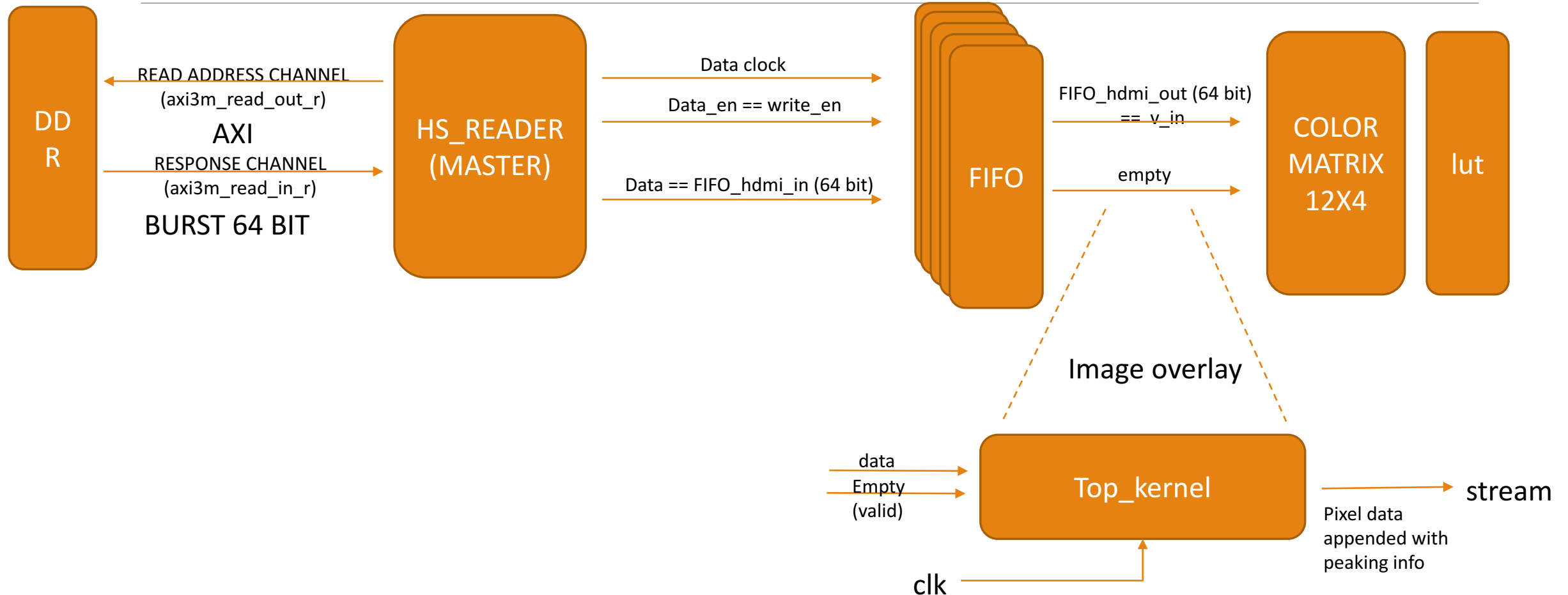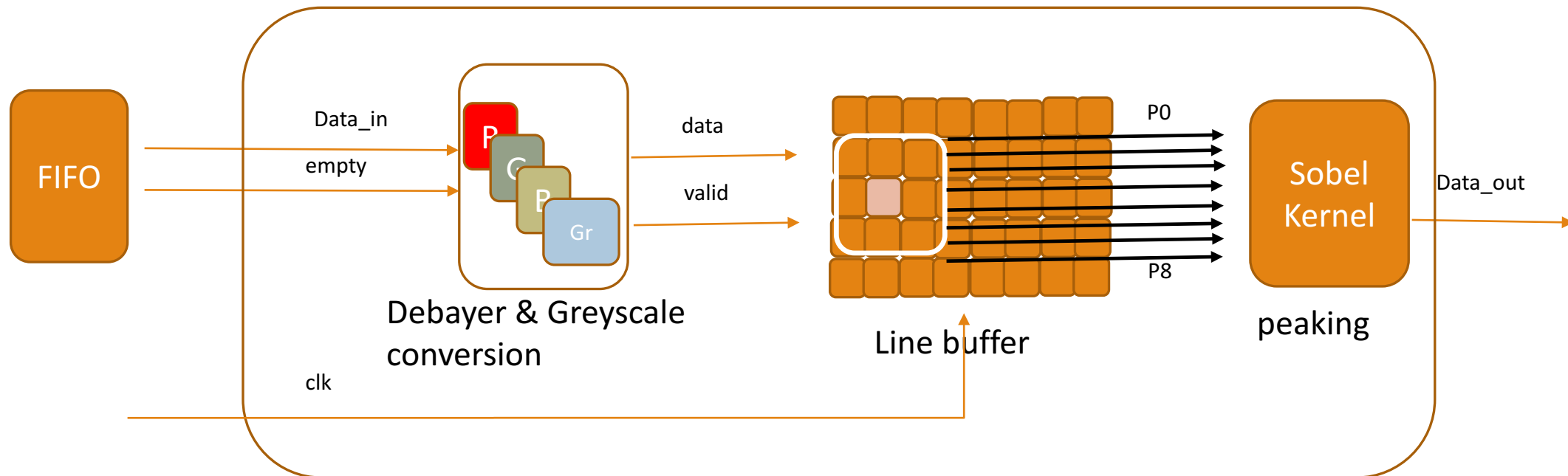
VHDL BASED KERNEL
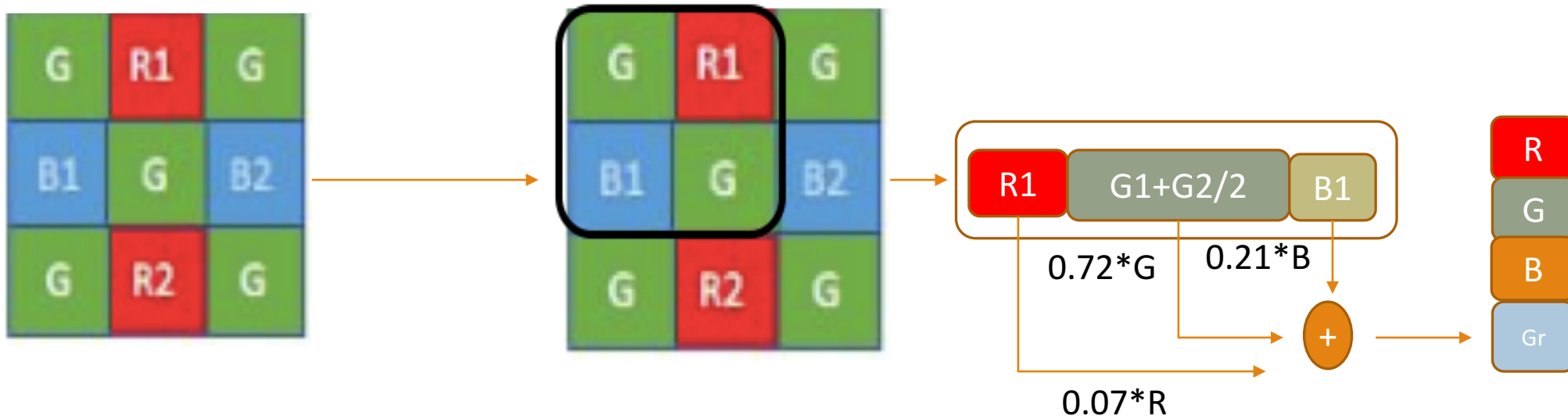
Output Image Processing Pipeline
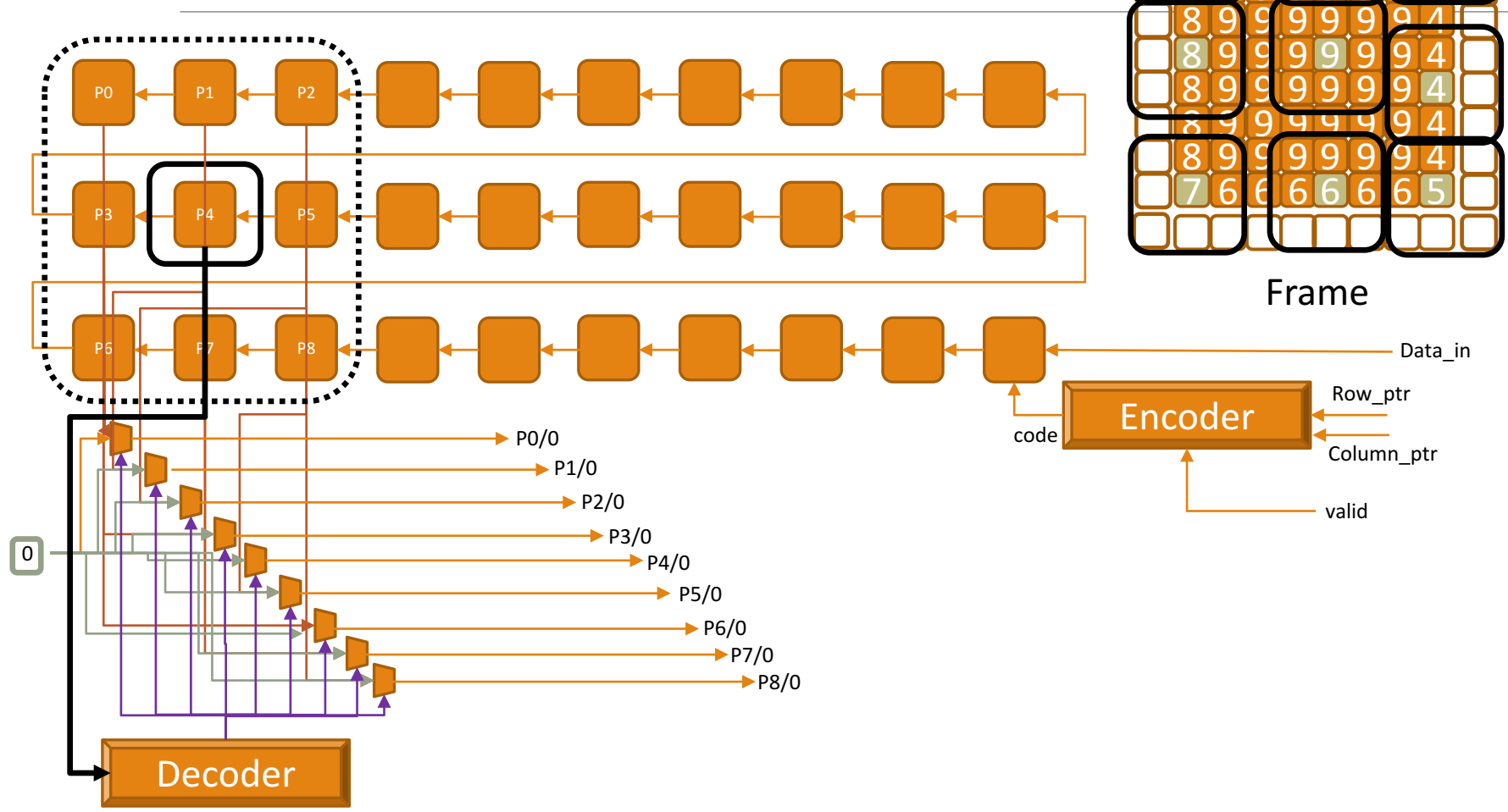
Top Module

FIFO

Data_in

empty

clk

Debayer & Greyscale conversion

data

valid

Line buffer

P0

P8

Sobel Kernel

Data_out

peaking

GRB Gr Module

Line buffer

Case	Code	Condition
C1	1000	L_ptr=0 &c_ptr=0
C2	1001	L_ptr=0 &c_ptr/=0 &c_ptr /= (columns-1)
C3	1010	L_ptr=0 & c_ptr /= (columns-1)
C4	1011	L_ptr/=0 & L_ptr/=0(Rows-1) & c_ptr /= (columns-1)
C5	1100	L_ptr/=0(Rows-1) & c_ptr /= (columns-1)
C6	1101	L_ptr/=0(Rows-1) & c_ptr/=0 & c_ptr /= (columns-1)
C7	1110	L_ptr/=0(Rows-1) & c_ptr/=0
C8	1111	L_ptr/=0 & L_ptr/=0(Rows-1) & c_ptr/=0
C9	0001	Normal case
	0000	NO ACTION

L_ptr = Row pointer
C_ptr = Column pointer

Sobel kernel

Multiplying by:-
-1 = 2s compliment
-2 = left shift and 2s compliment
2 = left shift
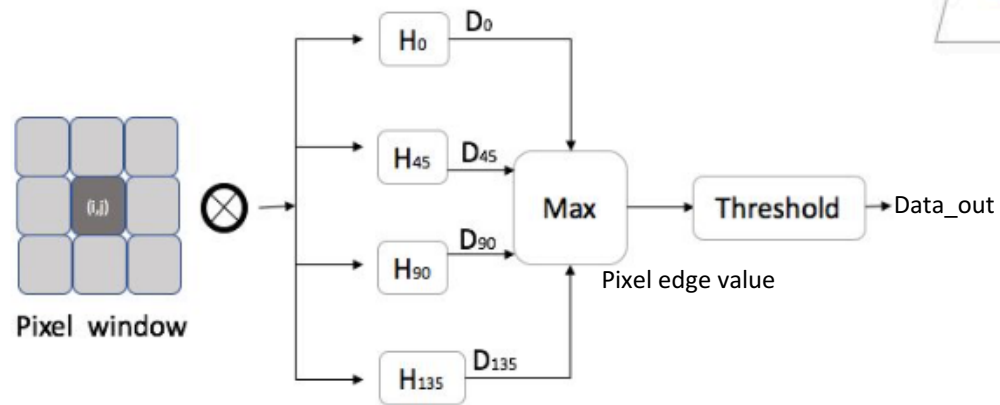
$$H_0 = \begin{bmatrix} -1 & -2 & -1 \\ 0 & 0 & 0 \\ 1 & 2 & 1 \end{bmatrix} \quad H_{45} = \begin{bmatrix} -2 & -1 & 0 \\ -1 & 0 & 1 \\ 0 & 1 & 2 \end{bmatrix} \quad H_{90} = \begin{bmatrix} -1 & 0 & 1 \\ -2 & 0 & 2 \\ -1 & 0 & 1 \end{bmatrix} \quad H_{135} = \begin{bmatrix} 0 & 1 & 2 \\ -1 & 0 & 1 \\ -2 & -1 & 0 \end{bmatrix}$$

END