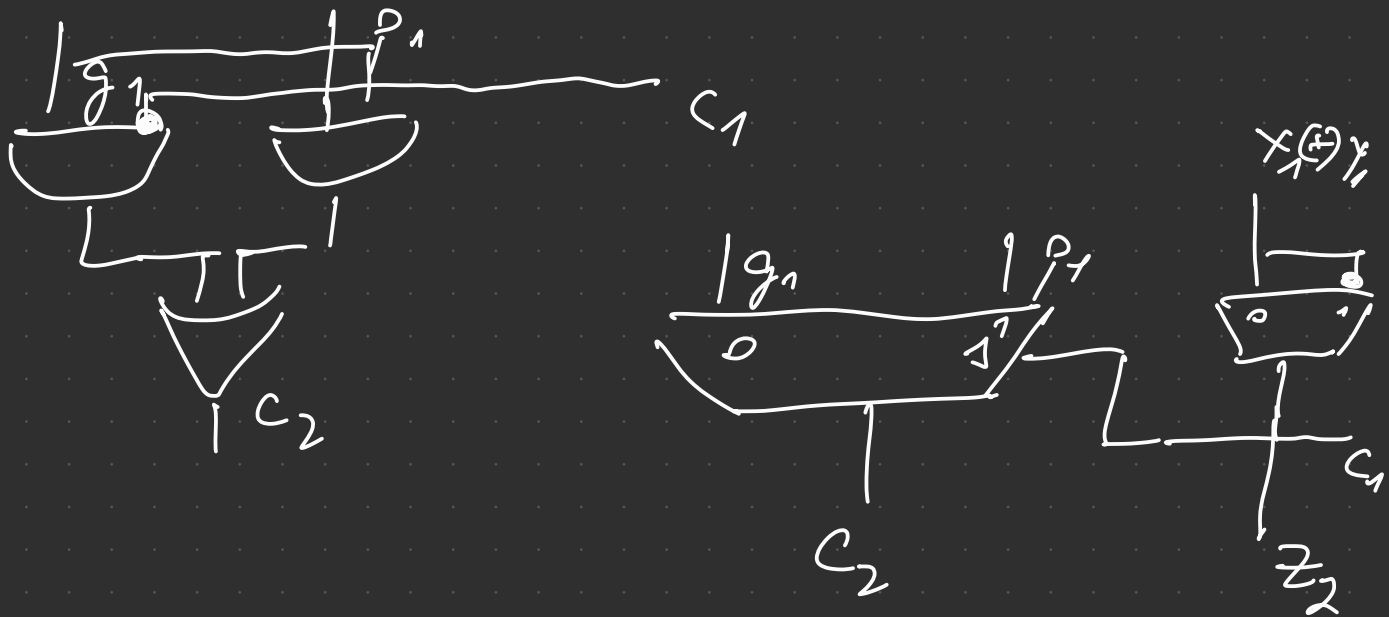
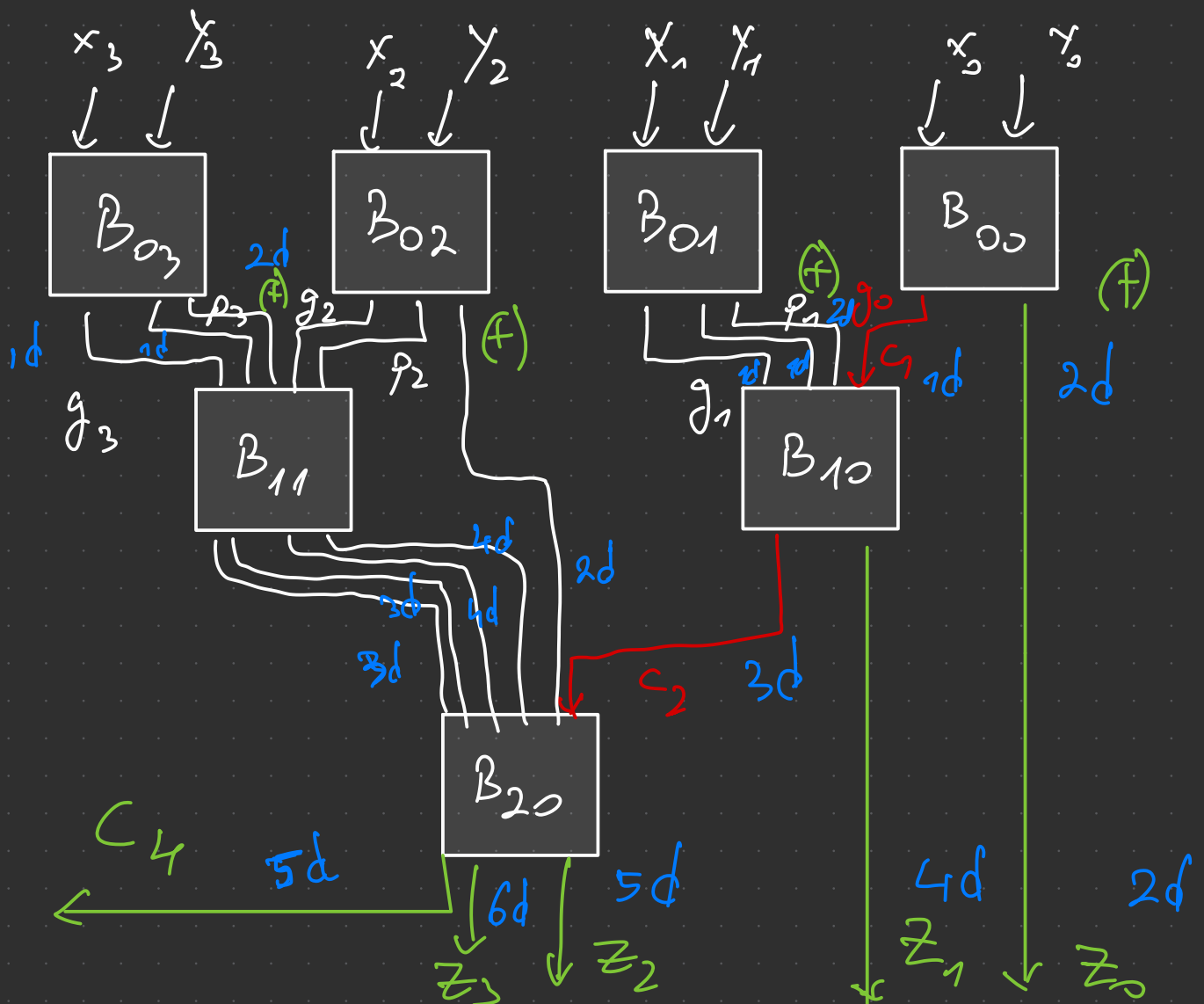


Conditional Sum Adder CSuA

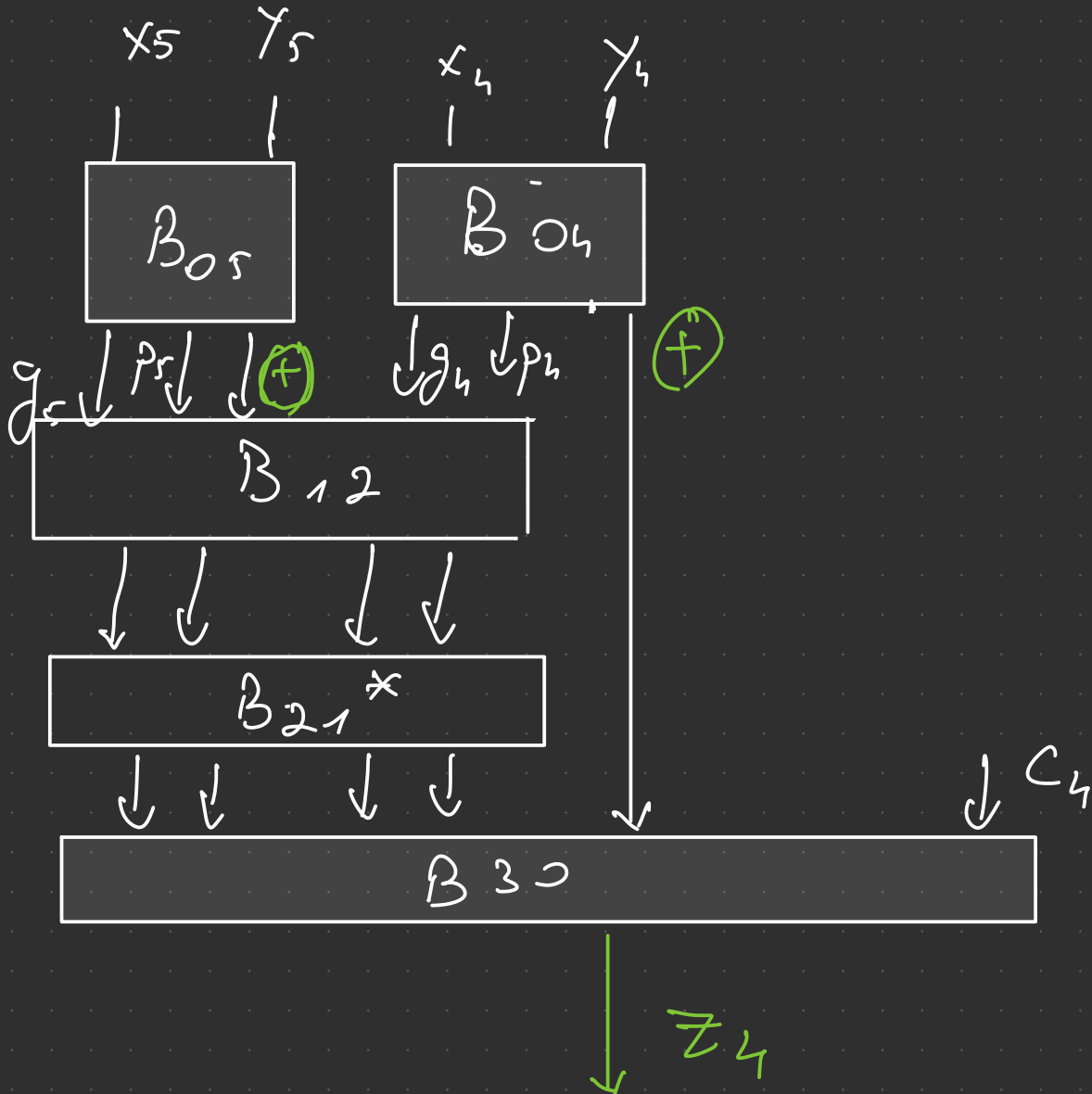


Intan zeri



$$n \text{ bits} \quad \Delta_{CS_{uA}}^z - n = 2d + 2 \lceil \log_2 n \rceil$$

$$\Delta_{CS_{uA}}^{\text{cont}} = 1d + 2 \lceil \log_2 n \rceil d$$



→ obligatoriu transport de intrare 0

$CS_u A$	$CS_e A$	ML-CLA	RCA
$\delta_Z = 18d$	$\delta_Z = 258d$	$\delta_Z = 31d$	$\delta_Z = 512d$
$\delta_{\text{Count}} = 17d$	$\delta_{\text{Count}} = 258d$	$\delta_{\text{Count}} = 19d$	$\delta_{\text{Count}} = 512d$

$$X = 0110010011$$
$$Y = 1101101110$$
[illegible]

$x = 0110010011$

$$Y = 1101101110$$

		9	8	7	6	5	4	3	2	1	0
x		0	1	1	0	0	1	0	0	1	1
y		1	1	0	1	1	0	1	1	1	0
Block Level	Carry	C	S	C	S	C	S	C	S	C	S
i=0	0	0	1	1	0	0	1	0	0	1	1
	1	1	0	1	1	0	1	0	1	1	0
i=1	0	1	0	0	1	1	0	1	1	0	1
	1	1	0	1	1	0	0	1	0	0	0
i=2	0	1	0	0	1	1	1	1	0	0	1
	1	1	0	1	1	0	0	0	0	0	0
i=3	0	1	0	0	1	0	0	0	0	0	1
	1	1	0	1	0	0	0	0	0	0	0
i=4	0	1	0	1	0	0	0	0	0	0	1
	1	1	0	1	0	0	0	0	0	0	0

Carry Save Adder

→ sumă în formă redundantă

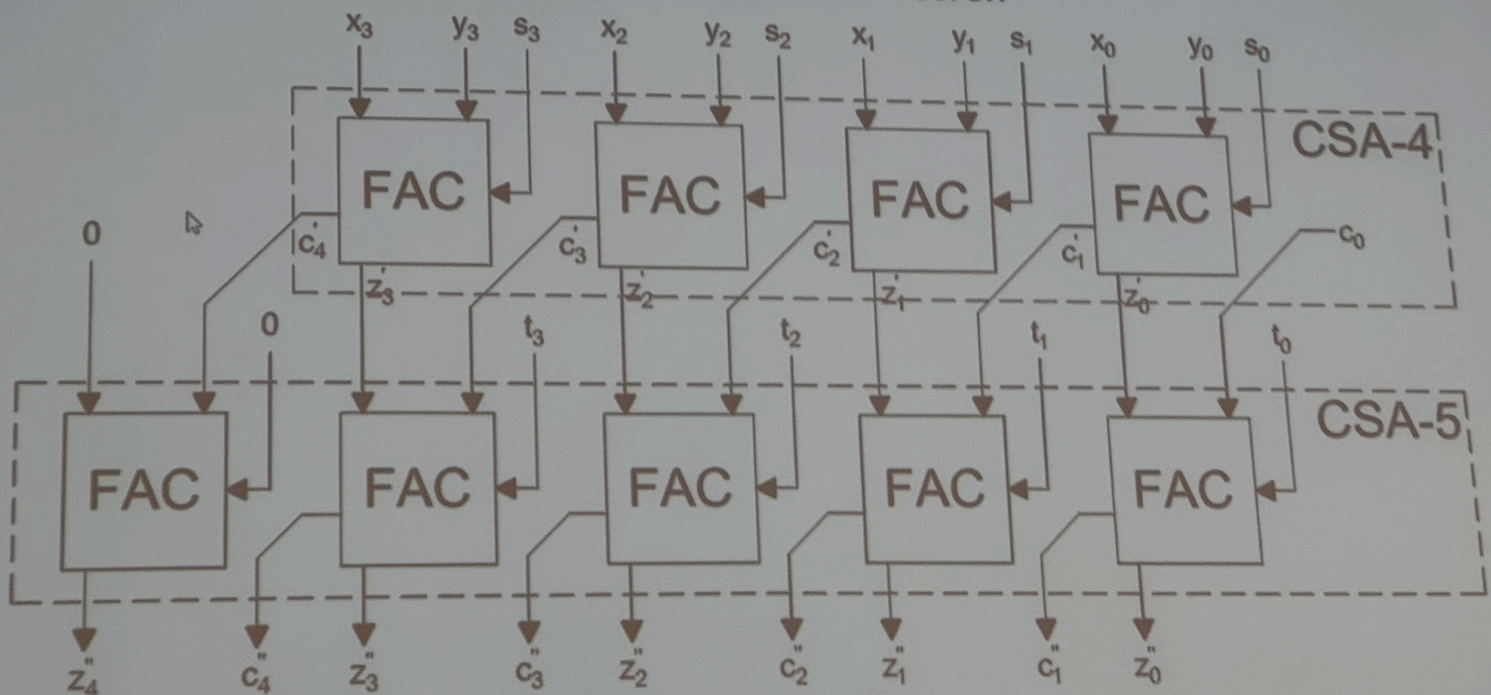
→ 2 vectori $\begin{cases} \text{sumă} \\ \text{transport} \end{cases}$

→ adunarea multi operand

x, y, s, t pe 4 biți $Z = x + y + s + t$

- ▶ sumă în format redundant: 2 vectori $\begin{cases} \text{sumă} \\ \text{transport} \end{cases}$
- ▶ vectorul transport este cu o poziție mai semnificativ decât cel sumă
- ▶ permite realizarea adunării multi-operand

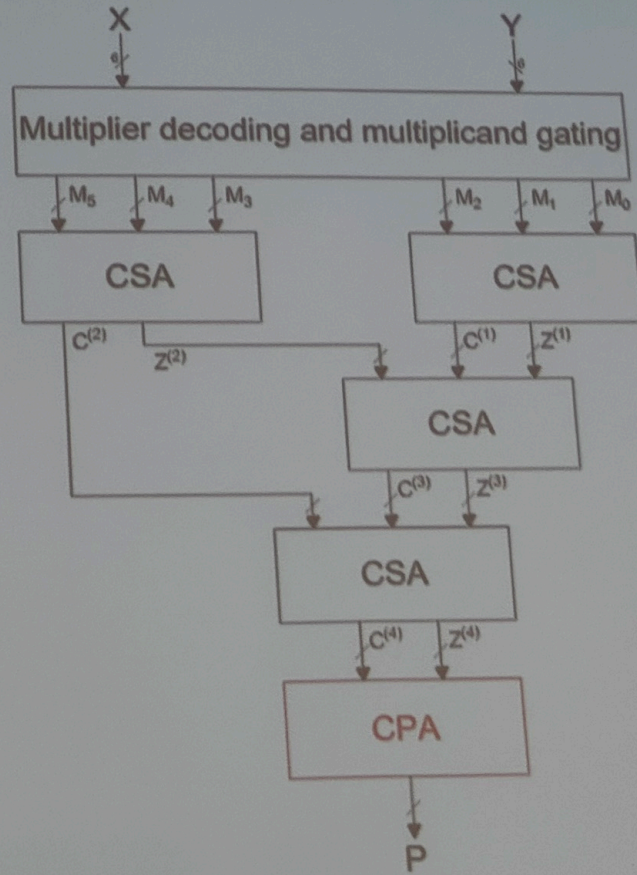
Se consideră operandii X, Y, S și T , pe 4 biți. Suma $Z = X + Y + S + T$ poate fi calculată astfel:



2.3.5 Carry Save Adder (contin.)

- facilitează realizarea operației de înmulțire (combinational)

Fie X și Y fără semn pe 6 biți. Produsul $P = X * Y$ este obținut prin adunarea produselor de 1-bit $M_i = x_i * Y * 2^i$



$$x = \begin{array}{ccc|ccc} x_5 & x_4 & x_3 & x_2 & x_1 & x_0 \\ 1 & 0 & 1 & 1 & 0 & 1 \end{array} = 45$$

$$Y = 1001 = 9$$

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$$M_i = x_i \cdot y - 2$$

M_0	1 0 0 1	M_3	1 0 0 1
M_1	0 0 0 0	M_4	0 0 0 0
M_2	1 0 0 1	M_5	1 0 0 1
$Z^{(1)}$	1 0 1 1 0 1	$Z^{(2)}$	1 0 1 1 0 1
$C^{(1)}$	0 0 0 0 0 0	$C^{(2)}$	0 0 0 0 0 0

$C^{(1)} \times 2$

$2C^{(1)}$ 0 0 0 0 0 0 0 0 | 0

$Z^{(1)}$ 0 0 0 1 0 1 1 0 1

$Z^{(2)}$ 1 0 1 1 0 1 0 0 0

$Z^{(3)}$ 1 0 1 0 0 0 1 0 1

$C^{(3)}$ 0 0 0 1 0 1 0 0 0

$2C^{(3)}$ 0 0 0 1 0 1 0 0 0

$Z^{(3)}$ 1 0 1 0 0 0 1 0 1

$2 \times C^{(2)}$ 0 0 0 0 0 0

$Z^{(4)}$ 0 1 0 0 0 1 0 1 0 1

$C^{(4)}$ 0 0 0 1 0 0 0 0 0 0

$2C^{(4)}$ 0 0 0 1 0 0 0 0 0 0

$Z^{(4)}$ 0 1 0 0 0 1 0 1 0 1

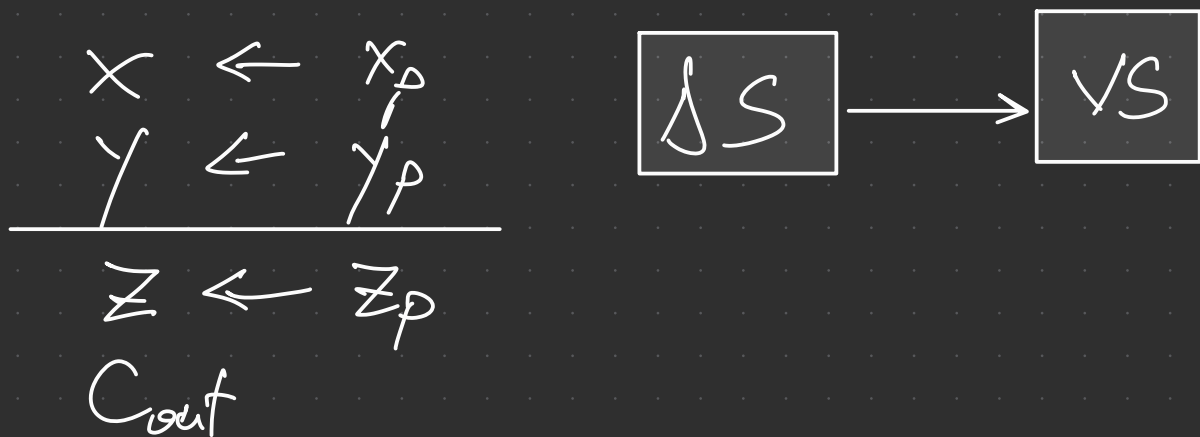
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P 0 0 1 1 0 0 1 0 1 0 1

Calcul fiabil

- disponibilitate
- fiabilitate
- mentenabilitate

Sumatoare binare cu control de paritate



$$x_p = x_{n-1} \oplus x_{n-2} \oplus \dots \oplus x_0$$

$$y_p = y_{n-1} \oplus \dots \oplus y_0$$

$$z_p = \text{---} \parallel \text{---}$$

$$z_i = x_i \oplus y_i \oplus c_i$$

$$z_p = x_p \oplus y_p \oplus \underbrace{(c_{n-1} \oplus c_{n-2} \oplus \dots \oplus c_0)}_{c_p}$$