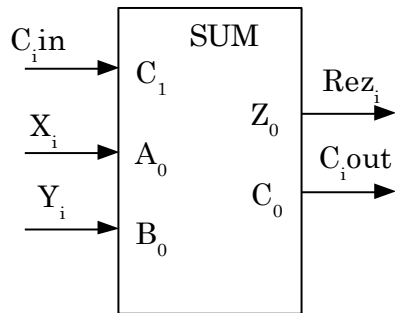


Implementarea unui sumator

$$C_{out_i} = (x_i \cdot C_{in_i}) \cup (y_i \cdot C_{in_i}) \cup (x_i \cdot y_i)$$

$$sum_i = (x_i \cdot \bar{y}_i \cdot \overline{C_{in_i}}) \cup (\bar{x}_i \cdot y_i \cdot \overline{C_{in_i}}) \cup (\bar{x}_i \cdot \bar{y}_i \cdot C_{in_i}) \cup (x_i \cdot y_i \cdot C_{in_i})$$

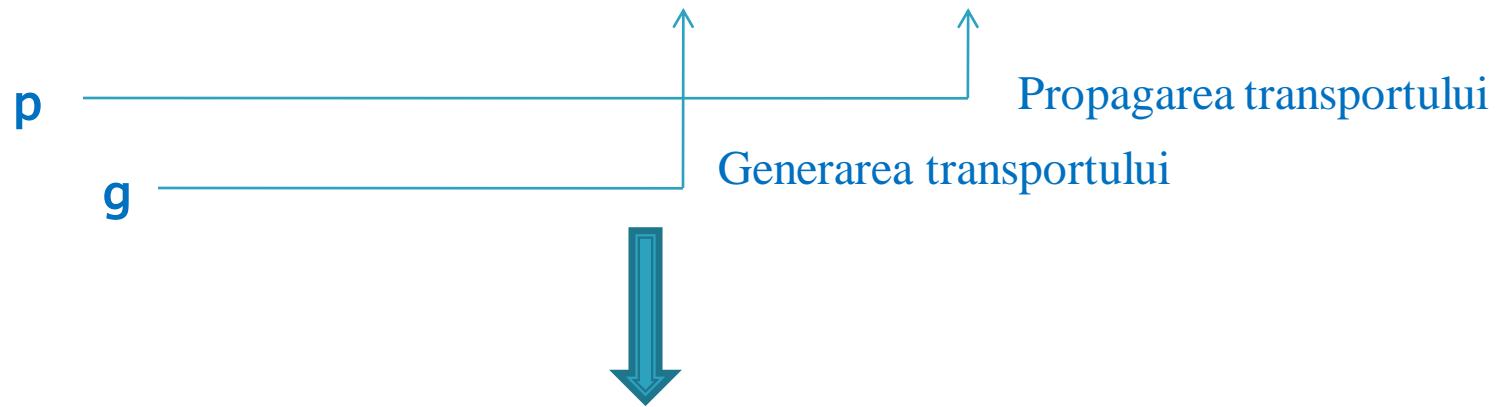


```
module fulladd(sum,carry,a,b,c);  
input a,b,c;  
output sum,carry;  
wire sum1;  
xor xor1(sum1,a,b);  
xor xor2(sum,sum1,c);  
and and1(c1,a,b);  
and and2(c2,b,c);  
and and3(c3,a,c);  
or or1(carry,c1,c2,c3);  
endmodule
```

Sumatorul cu anticiparea transportului

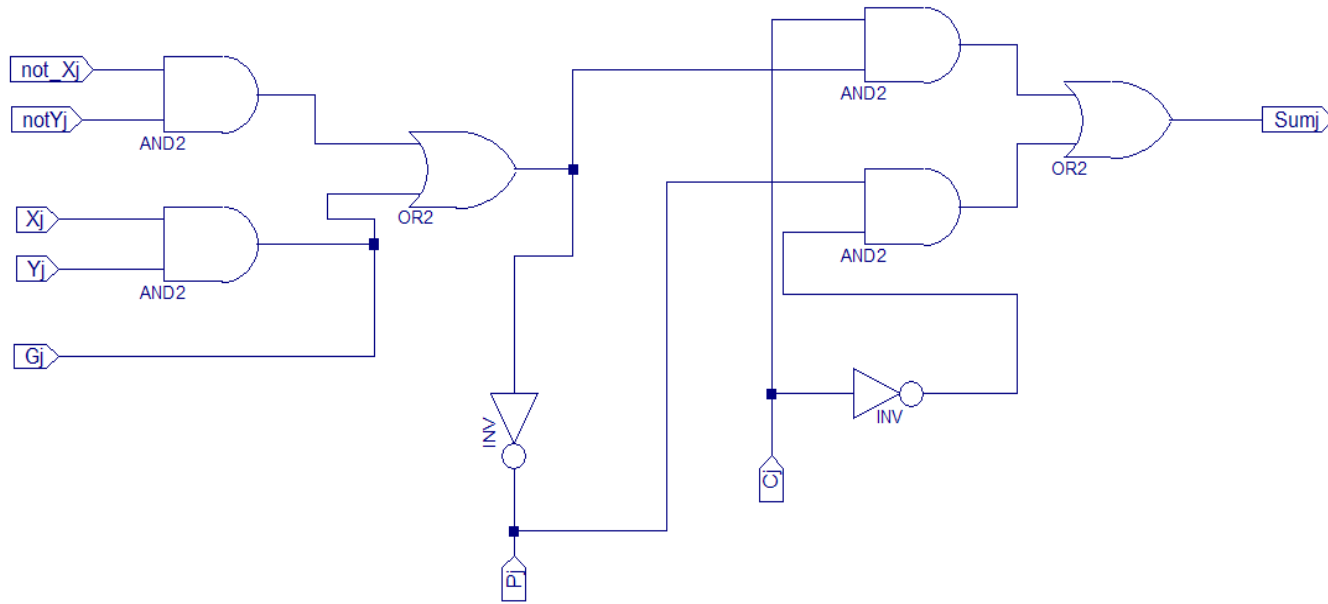
$$cin_1 = b_0 \cdot cin_0 + a_0 \cdot cin_0 + a_0 \cdot b_0$$

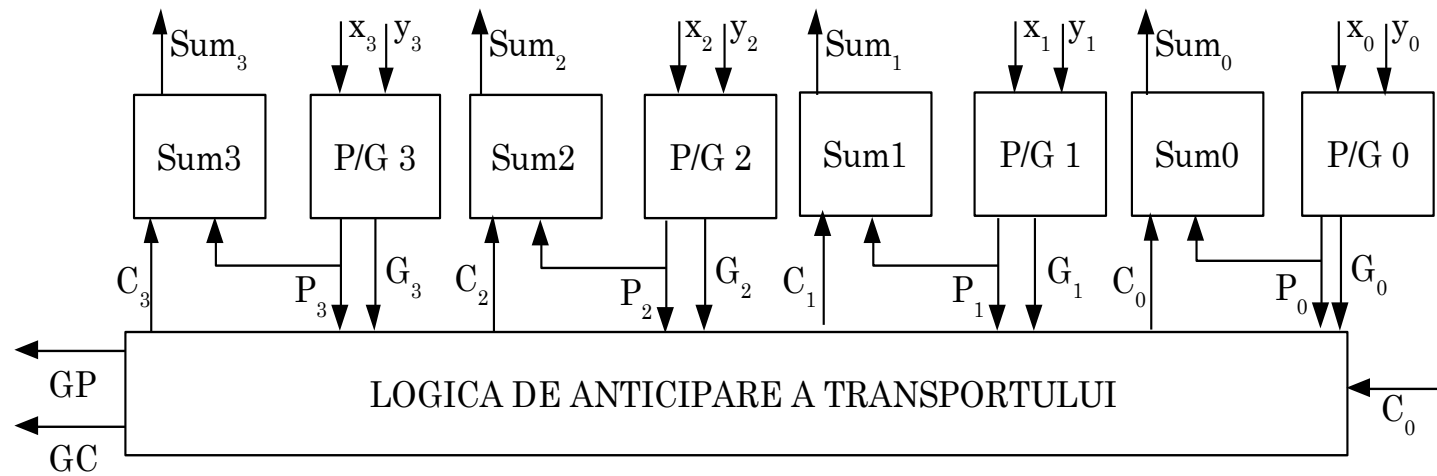
$$c_{i+1} = b_i \cdot c_i + a_i \cdot c_i + a_i \cdot b_i = a_i \cdot b_i + c_i \cdot (a_i + b_i)$$



$$c_{i+1} = g_i + p_i \cdot c_i$$

$$sum_i = a_i \wedge b_i \wedge c_i \Rightarrow sum_i = (\sim g_i p_i) \wedge c_i$$





Secțiune pe 4 biți a unui sumator cu anticipare a transportului

Nivel superior de abstractizare pentru trecerea la sumatorul de 16 biți.

Considerăm: $\left\{ \begin{array}{l} P - \text{propagarea transportului la nivel de bloc} \\ G - \text{generarea transportului la nivel de bloc} \end{array} \right.$

$$P_0 = p_3 \cdot p_2 \cdot p_1 \cdot p_0$$

$$P_1 = p_7 \cdot p_6 \cdot p_5 \cdot p_4$$

$$P_2 = p_{11} \cdot p_{10} \cdot p_9 \cdot p_8$$

$$P_3 = p_{15} \cdot p_{14} \cdot p_{13} \cdot p_{12}$$

$$G_0 = g_3 + p_3 \cdot g_2 + p_3 \cdot p_2 \cdot g_1 + p_3 \cdot p_2 \cdot p_1 \cdot g_0$$

$$G_1 = g_7 + p_7 \cdot g_6 + p_7 \cdot p_6 \cdot g_5 + p_7 \cdot p_6 \cdot p_5 \cdot g_4$$

$$G_2 = g_{11} + p_{11} \cdot g_{10} + p_{11} \cdot p_{10} \cdot g_9 + p_{11} \cdot p_{10} \cdot p_9 \cdot g_8$$

$$G_3 = g_{15} + p_{15} \cdot g_{14} + p_{15} \cdot p_{14} \cdot g_{13} + p_{15} \cdot p_{14} \cdot p_{13} \cdot g_{12}$$

$$C_1 = G_0 \cup (P_0 \cdot C_0)$$

$$C_2 = G_1 \cup (P_1 \cdot C_1) = G_1 \cup (P_1 \cdot G_0) \cup (P_1 \cdot P_0 \cdot C_0)$$

$$C_3 = G_2 \cup (P_2 \cdot C_2) = G_2 \cup (P_2 \cdot G_1) \cup (P_2 \cdot P_1 \cdot G_0) \cup (P_2 \cdot P_1 \cdot P_0 \cdot C_0)$$

$$C_4 = G_3 \cup (P_3 \cdot C_3) = G_3 \cup (P_3 \cdot G_2) \cup (P_3 \cdot P_2 \cdot G_1) \cup (P_3 \cdot P_2 \cdot P_1 \cdot G_0) \cup (P_3 \cdot P_2 \cdot P_1 \cdot P_0 \cdot C_0)$$

Sumator pe 16 biti

