Lecture 12 (exercise)

Array Multipliers: Problems

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Problem

- Using array multipliers give an ***optimum*** circuit for calculation of Y:
- Y= [4 **N (N)**] **-** 1
- where N is a 3-bit unsigned binary number. N = $a_2\, a_1\, a_0$
- Show your implementation with **N = 2.**
- Give a detailed estimate of delay and area (Full Adder, Half Adder AND gate or other entity used).
- Show the input to each adder clearly.

$4N(N)-1 \qquad N = q_2 q_1 q_0$

$q_2 q_1 q_0$

$q_2 q_1 q_0$

$q_0q_2 \quad q_0q_1 \quad q_0q_0$

$q_1q_2 \quad q_1q_1 \quad q_1q_0$

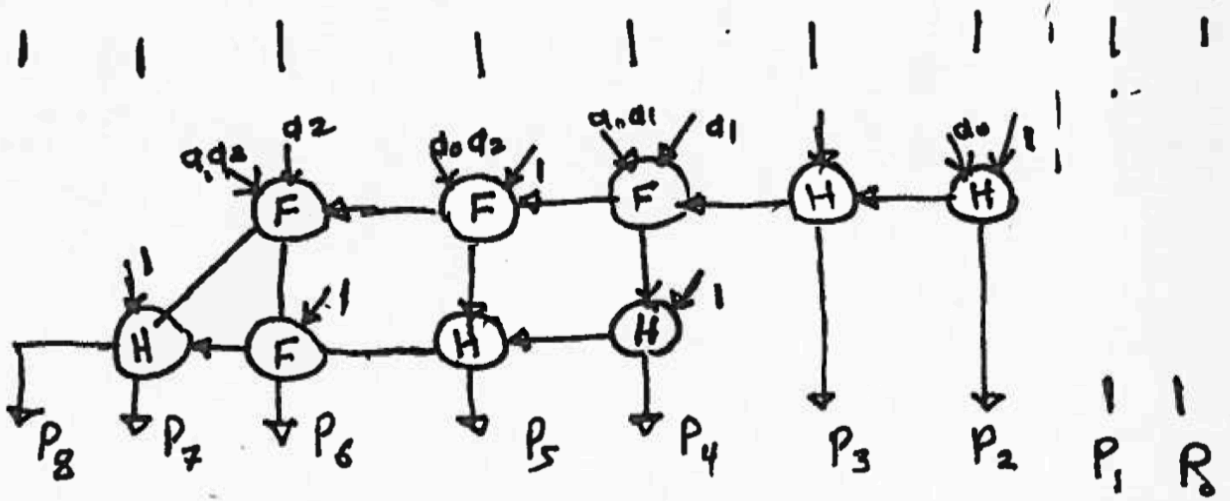
$q_2q_2 \quad q_2q_1 \quad q_2q_0$

$q_1q_2 \quad q_0q_2 \quad q_0q_1 \quad 0 \quad q_0 \quad 0 \quad 0$

$q_2 \quad 0 \quad q_1 \quad 0 \quad 0$

Shift 2 places to left

add -1



$$\text{Delay} = 2\tau_H + 3\tau_F + \tau_{AND}$$

$$A_{req} = 4A_H + 5A_F + 9A_A$$